

Features

- ESD protection for one line with uni-directional
- Provide transient protection for one 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) 100A (8/20 μs)
- Suitable for, **28V and below**, operating voltage applications
- 2.0mm x 2.0mm DFN package saves board space
- High surge protection
- Fast turn-on and low clamping voltage
- Solid-state silicon-avalanche and active circuit triggering technology
- **Green part**

Applications

- USB Power Delivery
- Power supply protection
- Cellular handsets and accessories
- Panel modules
- Portable devices
- Touch panels
- Notebooks and handhelds
- Peripherals

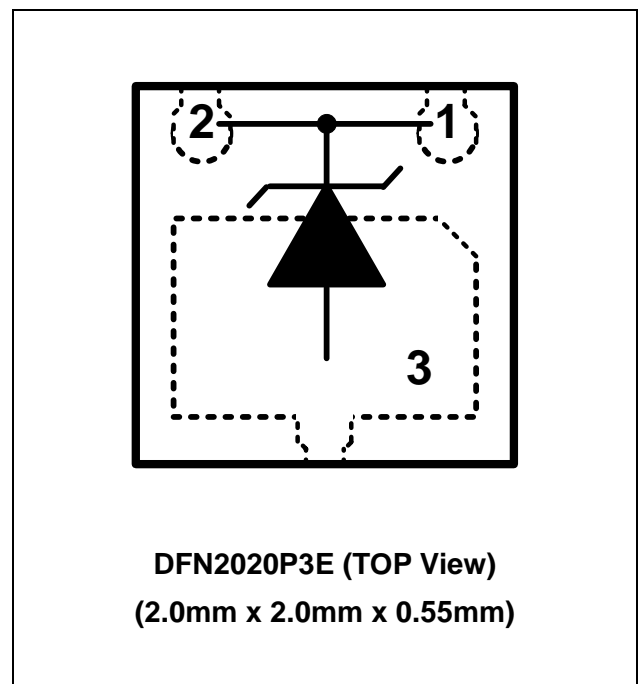
Description

AZ4728-01F is a design which includes a uni-directional surge rated clamping cell to protect one power line, one control line, or one low-speed data line in an electronic system. The AZ4728-01F has been specifically designed to protect sensitive components which are connected to power and control lines from over-voltage damage caused by Electrostatic Discharging (ESD), Electrical Fast Transient (EFT), Lightning, and Cable Discharge Event (CDE).

AZ4728-01F 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, control lines, or data lines, protecting any downstream component.

AZ4728-01F 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 ($T_A = 25^\circ\text{C}$, unless otherwise specified)			
Parameter	Symbol	Rating	Unit
Peak Pulse Current ($t_p=8/20\mu\text{s}$)	I_{PP} (Note 1)	100	A
Operating Voltage (Pin-1 and pin-2 to pin-3)	V_{DC}	30.8	V
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.)	$^\circ\text{C}$
Operating Temperature	T_{OP}	-55 to +125	$^\circ\text{C}$
Storage Temperature	T_{STO}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics						
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Reverse Stand-Off Voltage	V_{RWM}	Pin-1 and pin-2 to pin-3, $T = 25^\circ\text{C}$.			28	V
Reverse Leakage Current	I_{Leak}	$V_{RWM} = 28\text{V}$, $T = 25^\circ\text{C}$, pin-1 and pin-2 to pin-3.			0.5	μA
Reverse Breakdown Voltage	V_{BV}	$I_{BV} = 1\text{mA}$, $T = 25^\circ\text{C}$, pin-1 and pin-2 to pin-3.	31.4		34.7	V
Forward Voltage	V_F	$I_F = 15\text{mA}$, $T = 25^\circ\text{C}$, pin-3 to pin-1 and pin-2.	0.5		1	V
Surge Clamping Voltage (Note 1)	$V_{CL-surge}$	$I_{PP} = 5\text{A}$, $t_p = 8/20\mu\text{s}$, $T = 25^\circ\text{C}$, pin-1 and pin-2 to pin-3.		33		V
		$I_{PP} = 100\text{A}$, $t_p = 8/20\mu\text{s}$, $T = 25^\circ\text{C}$, pin-1 and pin-2 to pin-3.		49		V
ESD Clamping Voltage (Note 2)	V_{CL-ESD}	IEC 61000-4-2 +8kV ($I_{TLP} = 16\text{A}$), $T = 25^\circ\text{C}$, contact mode, pin-1 and pin-2 to pin-3.		33		V
ESD Dynamic Turn-on Resistance	$R_{dynamic}$	IEC 61000-4-2 0~+8kV, $T = 25^\circ\text{C}$, contact mode, pin-1 and pin-2 to pin-3.		0.06		Ω
Channel Input Capacitance	C_{IN}	$V_{IN} = 0\text{V}$, $f = 1\text{MHz}$, $T = 25^\circ\text{C}$, pin-1 and pin-2 to pin-3.		485	600	pF

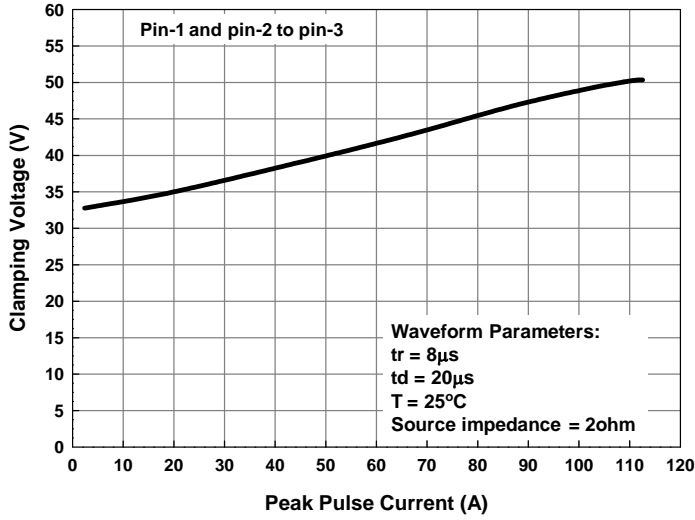
Note 1: The Peak Pulse Current measured conditions: $t_p = 8/20\mu\text{s}$, 2Ω source impedance.

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

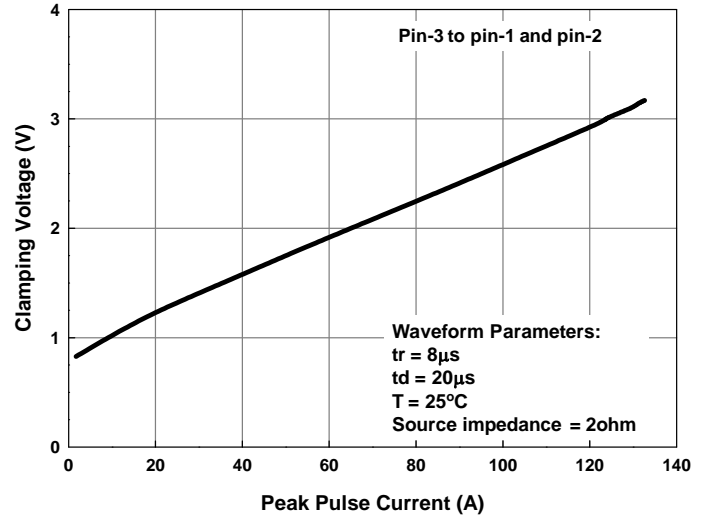
TLP conditions: $Z_0 = 50\Omega$, $t_p = 100\text{ns}$, $t_r = 1\text{ns}$.

Typical Characteristics

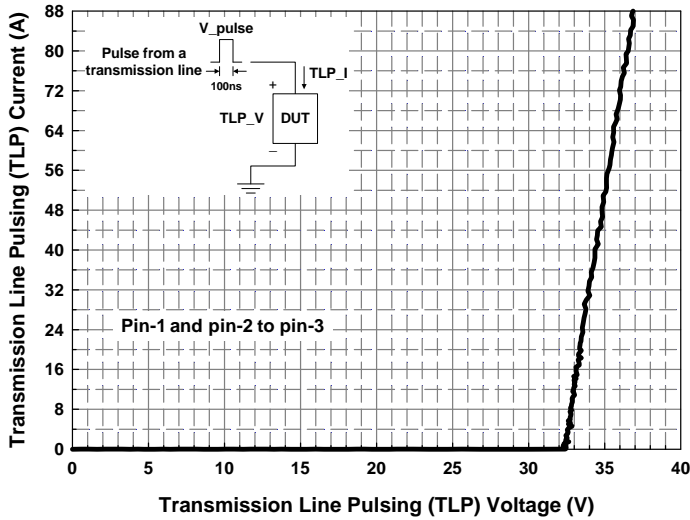
Reverse Clamping Voltage vs. Peak Pulse Current



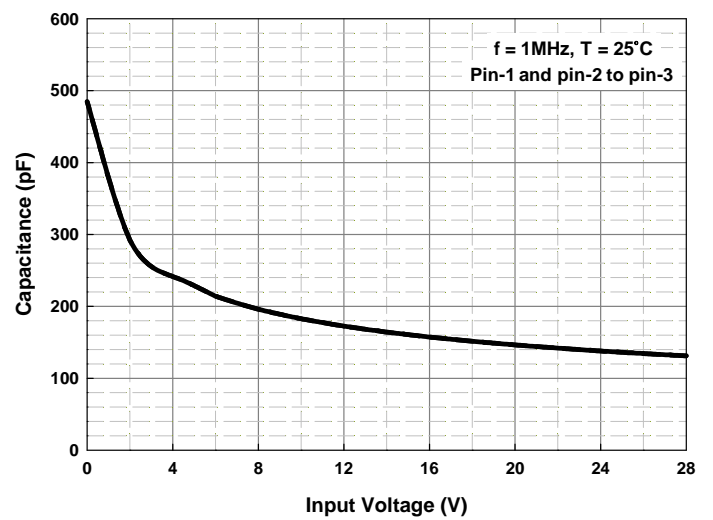
Forward Clamping Voltage vs. Peak Pulse Current



Transmission Line Pulsing (TLP) Measurement



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



Application Information

The AZ4728-01F is designed to protect one line against system ESD/EFT/Lightning pulses by clamping them to an acceptable reference.

The usage of the AZ4728-01F is shown in Fig. 1. Protected lines, such as data lines, control lines, or power lines, are connected to pin-1 and pin-2. The pin-3 should be connected directly to a ground plane on the board. All path lengths connected to the pins of AZ4728-01F 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 AZ4728-01F.
- Place the AZ4728-01F 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.

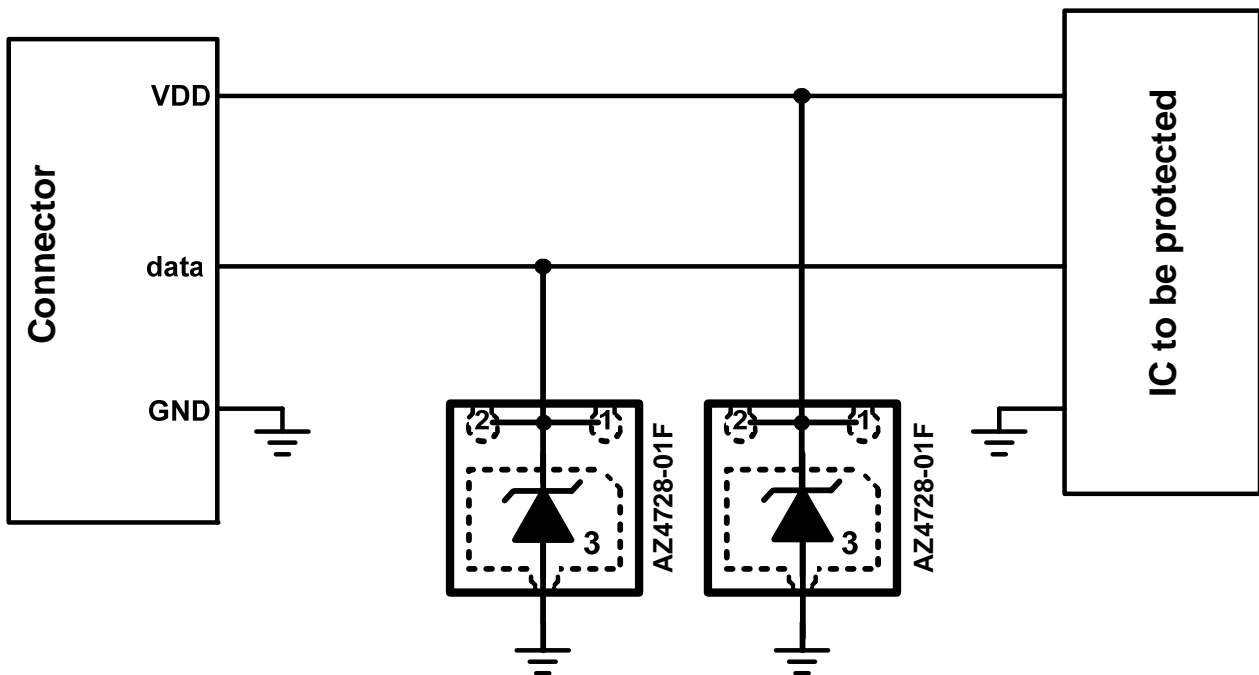


Fig. 1

Fig. 2 shows another simplified example of using low-speed data lines, and power lines from ESD AZ4728-01F to protect the control lines, transient stress.

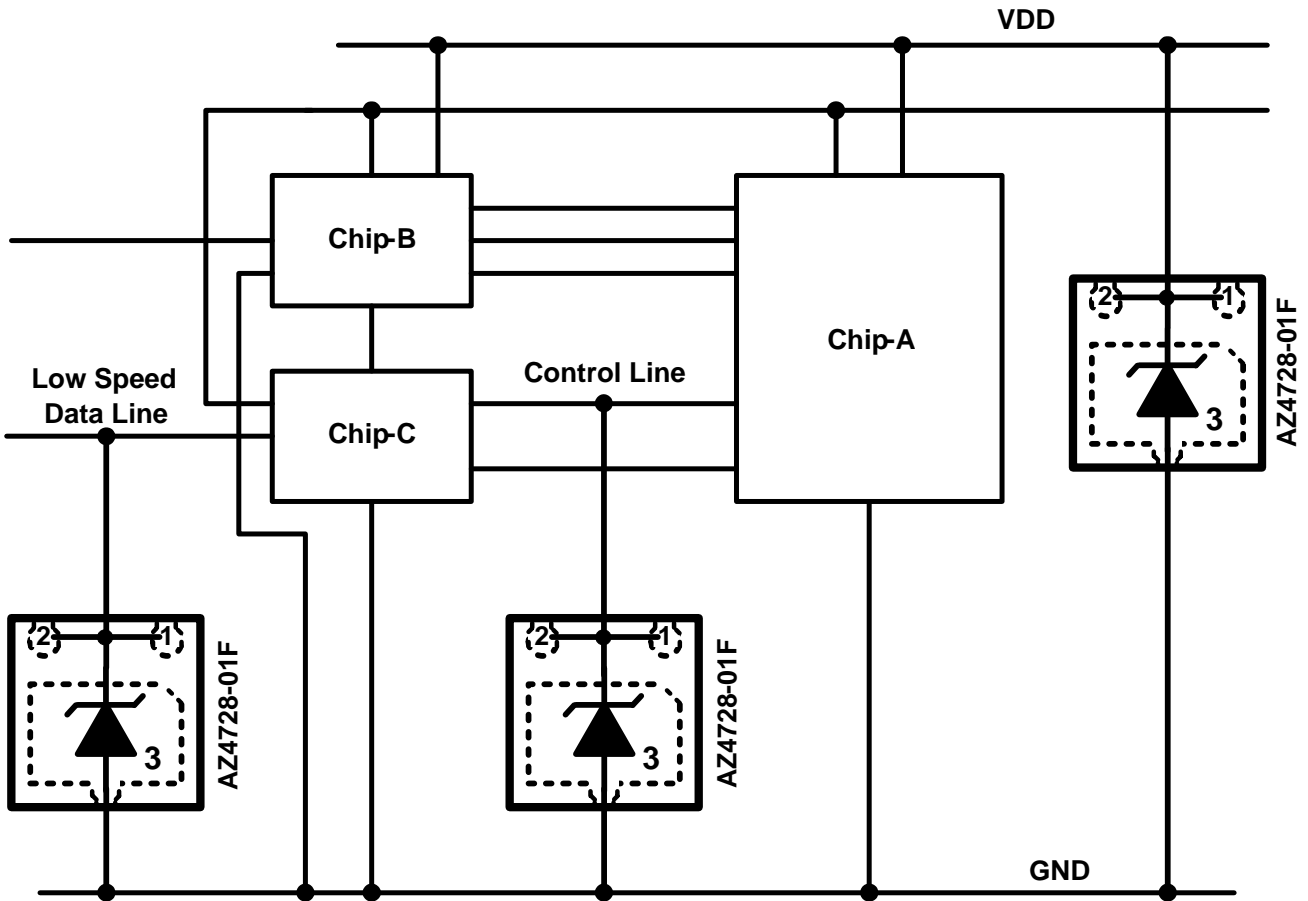


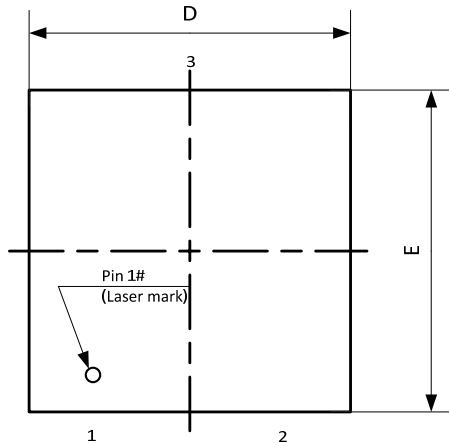
Fig. 2

Mechanical Details

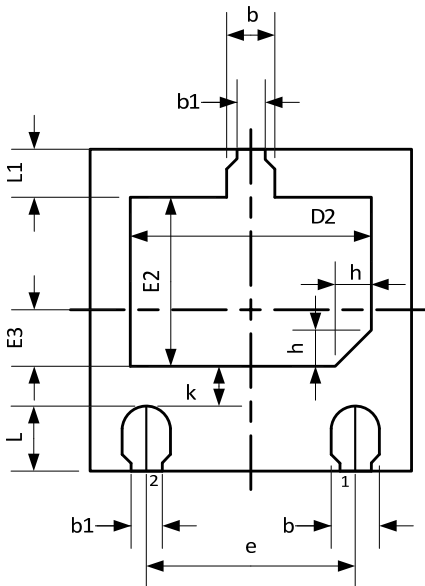
DFN2020P3E

Package Diagrams

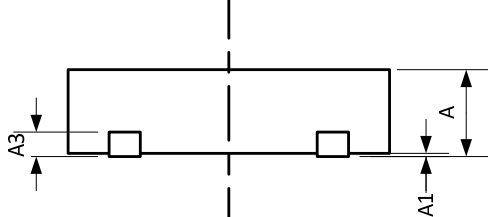
TOP VIEW



BOTTOM VIEW



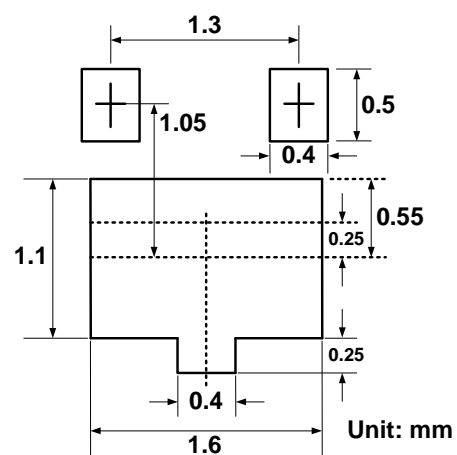
SIDE VIEW



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	0.20 BSC		
A3	0.152 BSC		
D	1.90	2.00	2.10
D2	1.40	1.50	1.60
e	1.30 BSC		
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	0.20 REF		
k	0.20	0.30	0.40

Land Layout

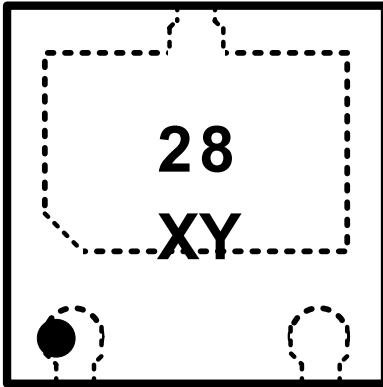


Notes:

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



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

Part Number	Marking Code
AZ4728-01F.R7G (Green Part)	28 XY

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

Ordering Information

PN#	Material	Type	Reel size	MOQ	MOQ/internal box	MOQ/carton
AZ4728-01F.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 2023/08/28	Formal Release.