

## Features

- Transient Protection for 4 Differential Line Pairs (8 lines) with Bi-directional.
- Provide Transient Protection for the Protected Differential Line Pair to  
**IEC 61000-4-2 (ESD)  $\pm 30\text{kV}$  (contact/air)**  
**IEC 61000-4-4 (EFT) 80A (5/50ns)**  
**IEC 61000-4-5 (Lightning) 30A (8/20 $\mu\text{s}$ ) Cable Discharge Event (CDE)**
- JEDEC SO-8 Package.
- Specific Pin Out For Easy Board Layout.
- Fast Turn-On and Low Clamping Voltage.
- Low Operating Voltage: 2.8V.
- Low Leakage Current
- Solid-State Silicon-Avalanche and Active Circuit Triggering Technology.
- ROHS part is available
- Green part is available

## Applications

- WAN/LAN Device
- 10/100/1000 Ethernet
- Switching Systems
- Computers
- Instruments
- Differential Inputs

## Description

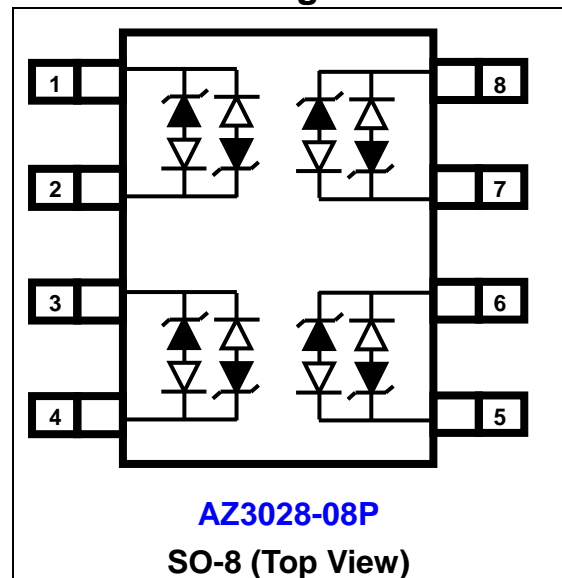
AZ3028-08P is a design which includes bi-directional surge rated clamping cells to protect two differential high speed data-line pairs in an electronic systems. The AZ3028-08P has been specifically designed to protect sensitive components which are connected to the differential line pairs from over-voltage damage and latch-up caused by Electrostatic Discharging (ESD), Electrical Fast Transients (EFT), Lightning, and Cable Discharge Event (CDE). AZ3028-08P is a unique design which includes

proprietary clamping cells in a single package. During transient conditions, the proprietary clamping cells provide low clamping voltages to minimize the stress on the protected components.

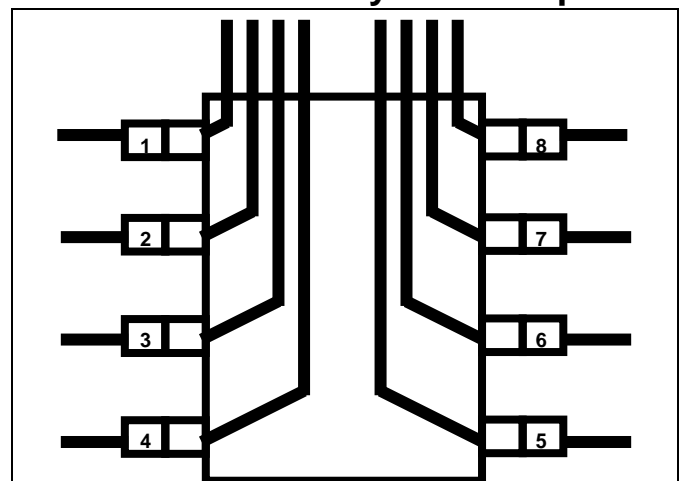
AZ3028-08P is bi-directional and may be used on lines where the signal swings above and below ground.

AZ3028-08P 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



### Circuit Board Layout Example





## SPECIFICATIONS

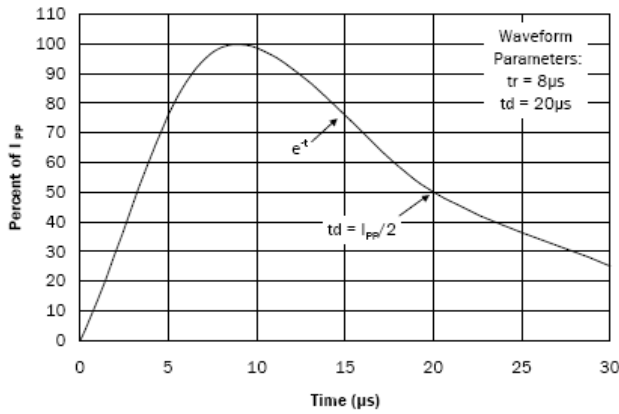
ABSOLUTE MAXIMUM RATINGS			
PARAMETER	SYMBOL	RATING	UNITS
Peak Pulse Current (tp =8/20us) for each differential line pair	$I_{PP}$	30	A
ESD per IEC 61000-4-2 (Contact /Air) for each differential line pair	$V_{ESD}$	±30	kV
Lead Soldering Temperature	$T_{SOL}$	260 (10 sec.)	°C
Operating Temperature	$T_{OP}$	-55 to +125	°C
Storage Temperature	$T_{STO}$	-55 to +150	°C

ELECTRICAL CHARACTERISTICS						
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Reverse Stand-Off Voltage	$V_{RWM}$	$T=25\text{ }^{\circ}\text{C}$ .			2.8	V
Reverse Leakage Current	$I_{Leak}$	$V_{RWM} = 2.8\text{V}$ , $T=25\text{ }^{\circ}\text{C}$ (Each Line)			1	μA
Reverse Breakdown Voltage	$V_{BV}$	$I_{BV} = 1\text{mA}$ , $T=25\text{ }^{\circ}\text{C}$ . (Each Differential Line Pair)	3			V
Snap-Back Voltage	$V_{SB}$	$I_{SB} = 50\text{mA}$ . (Each Differential Line Pair)	2.8			V
Clamping Voltage	$V_{CL}$	$I_{PP}=5\text{A}$ , $tp=8/20\text{us}$ , $T=25\text{ }^{\circ}\text{C}$ . (Each Differential Line Pair)			12	V
Clamping Voltage	$V_{CL}$	$I_{PP}=24\text{A}$ , $tp=8/20\text{us}$ , $T=25\text{ }^{\circ}\text{C}$ . (Each Differential Line Pair)			16	V
Clamping Voltage	$V_{CL}$	$I_{PP}=30\text{A}$ , $tp=8/20\text{us}$ , $T=25\text{ }^{\circ}\text{C}$ . (Each Differential Line Pair)			18	V
Channel Input Capacitance	$C_{IN}$	$V_R = 0\text{V}$ , $f = 1\text{MHz}$ , $T=25\text{ }^{\circ}\text{C}$ . (Each Differential Line Pair)		3.0	4.5	pF

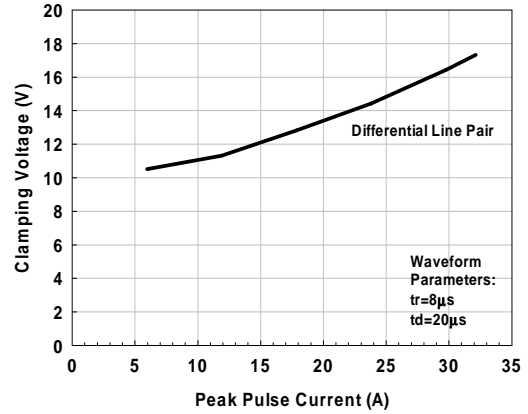


## Typical Characteristics

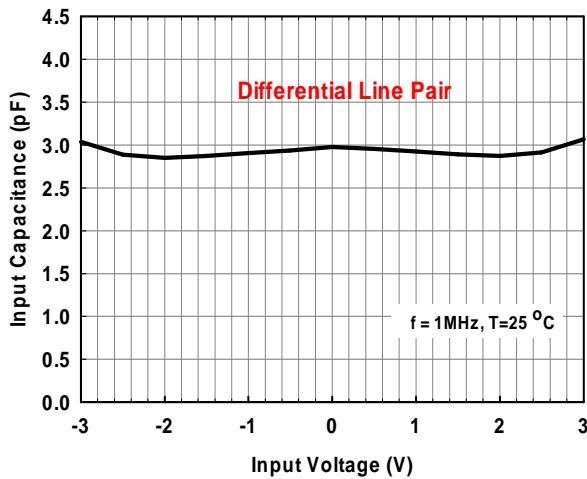
Pulse Waveform



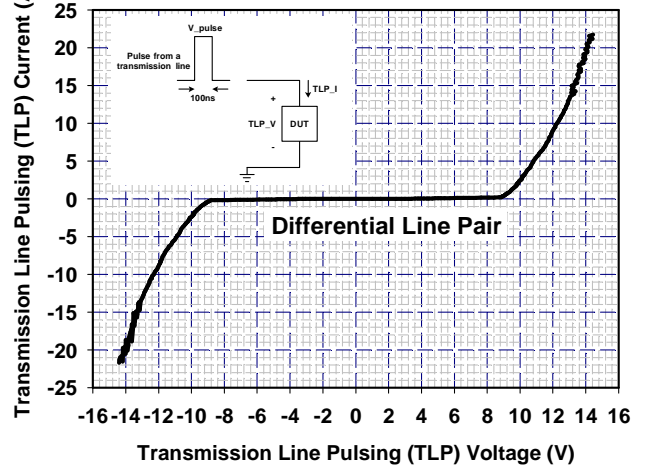
Clamping Voltage vs. Peak Pulse Current



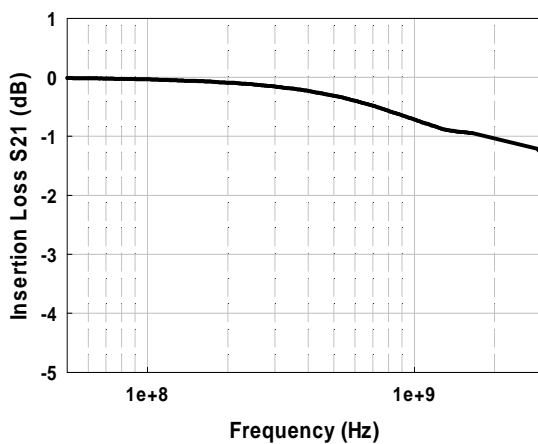
Typical Variation of C<sub>IN</sub> vs. V<sub>IN</sub>



Transmission Line Pulsing (TLP) Measurement



Insertion Loss S21



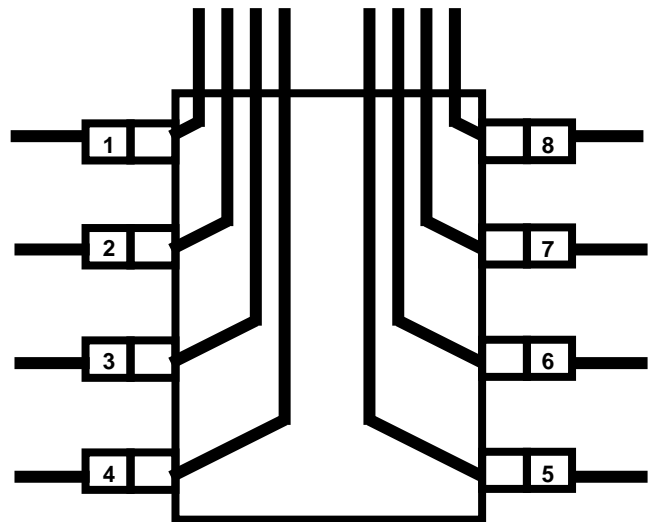
## Applications Information

The AZ3028-08P is designed to protect eight lines against System ESD/EFT/Lightning pulses by clamping them to an acceptable reference. It provides bi-directional protection.

The usage of the AZ3028-08P is shown in Fig. 1. It can be configured to protect four high speed line pairs (eight lines). The first line pair is connected to Pin-1 and Pin-2, simultaneously. The second line pair is connected to Pin-3, and Pin-4, simultaneously. The third line pair is connected to Pin-5 and Pin-6, simultaneously. The fourth line pair is connected to Pin-7, and Pin-8, simultaneously. The traces must be connected at the bottom of AZ3028-08P.

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 AZ3028-08P.
- Place the AZ3028-08P 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 transience easily injects to.

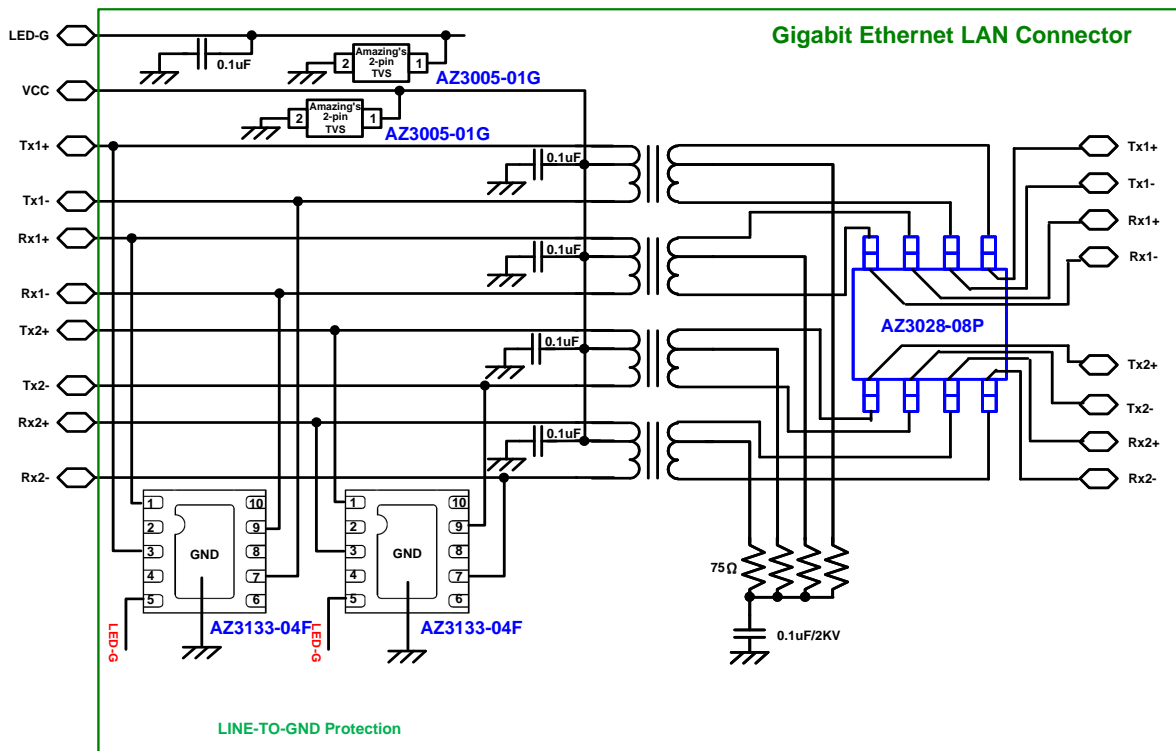


**Fig. 1**  
**Configuration for protecting two differential line pairs**



## Typical Applications

The Gigabit Ethernet protection circuit with AZ3028-08P is shown in Fig. 2. One AZ3028-08P is used for Line-to-Line protection. Two Amazing's 6-pin TVS arrays, such as AZ3133-04F, can be used for Line-to-Ground protection. To further suppress transient voltage on VCC and LED, Amazing's 2-pin TVS array, such as AZ3005-01G, can be chose.

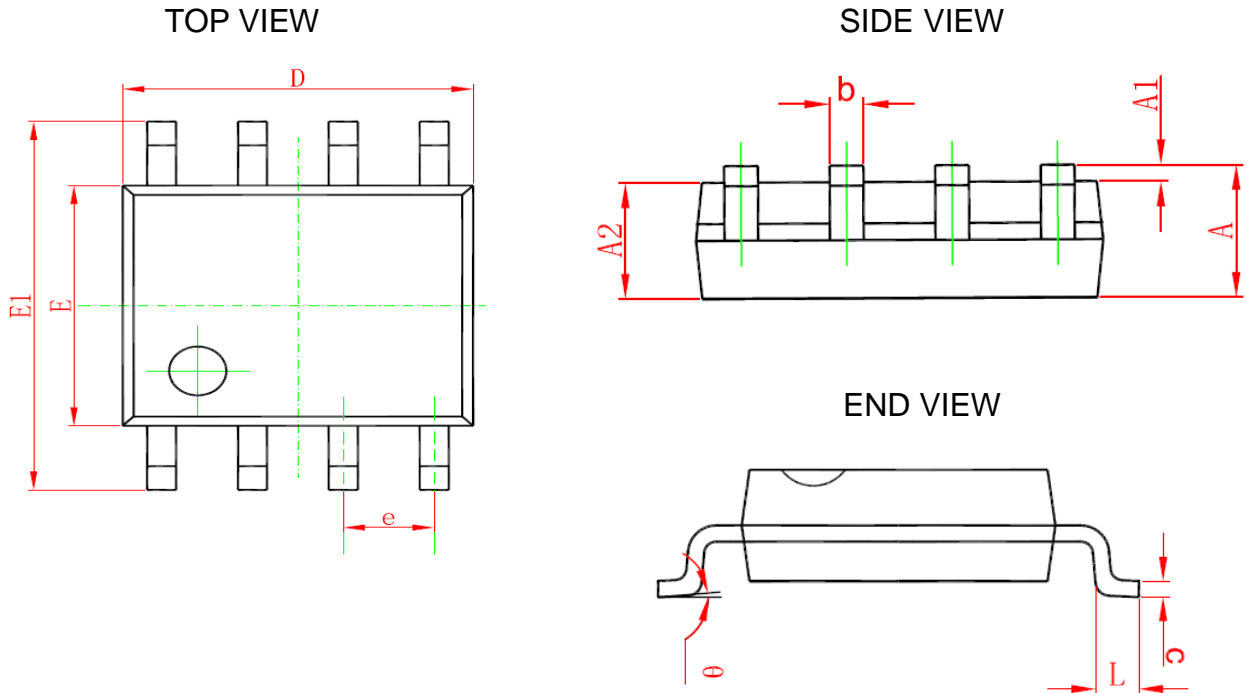


**Fig. 2**  
**Gigabit Ethernet Protection Circuit**



## Mechanical Details

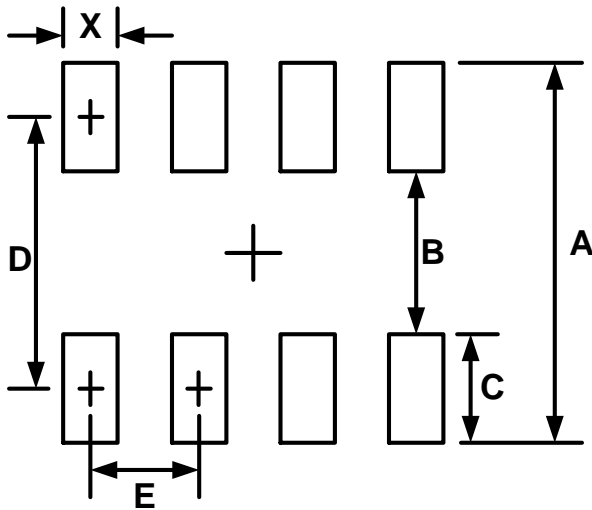
### SO-8 PACKAGE DIAGRAMS



### PACKAGE DIMENSIONS

Symbol	Millimeters		Inches	
	min	max	min	max
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.35	1.55	0.053	0.061
b	0.33	0.51	0.013	0.020
C	0.17	0.26	0.007	0.010
D	4.70	5.10	0.185	0.201
E	3.70	4.10	0.146	0.161
E1	5.80	6.20	0.228	0.244
e	1.27 BSC		0.05BSC	
L	0.40	1.27	0.016	0.050
$\theta$	0	8	0	8

## LAND LAYOUT

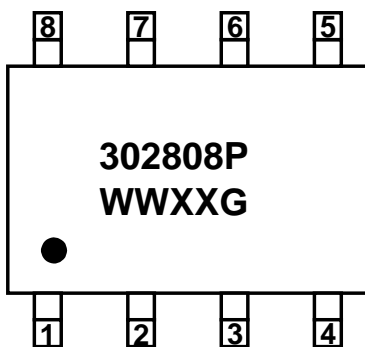


Dimensions		
Index	Millimeter	Inches
A	7.40	0.291
B	3.00	0.118
C	2.20	0.087
D	5.20	0.205
E	1.27	0.050
X	0.60	0.24

### 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



302808P = Device Code  
WWXXG = Date Code

Part Number	Marking Code
AZ3028-08P (Green Part)	302808P WWXXG

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

## Ordering Information

PN#	Material	Type	Reel size	MOQ	MOQ/internal box	MOQ/carton
AZ3028-08P.RDG	Green	T/R	13 inch	2,500/reel	1 reel=2,500/box	5 box=12,500/carton



## Revision History

Revision	Modification Description
Revision 2013/08/15	Preliminary Release.
Revision 2014/02/14	Formal Release.
Revision 2014/12/29	Update the Ordering Information.