## Features

- Transient protection for gigabit ethernet lines-to-lines
- Provide transient protection for the protected differential line pair to
  **IEC 61000-4-2 (ESD) ±30kV (air/contact)**
  **IEC 61000-4-4 (EFT) 80A (5/50ns)**
  **IEC 61000-4-5 (Lightning) 45A (8/20μs)**
- DFN3020P10E package
- Specific pin out for easy board layout
- Fast turn-on and low clamping voltage
- Low capacitance for high speed interfaces
- For low operating voltage applications: 2.5V
- Low leakage current
- Solid-state silicon-avalanche and active circuit triggering technology
- ***Green part***

## Applications

- WAN/LAN device
- 10/100/1000 ethernet
- Switching systems
- Computers
- Instruments

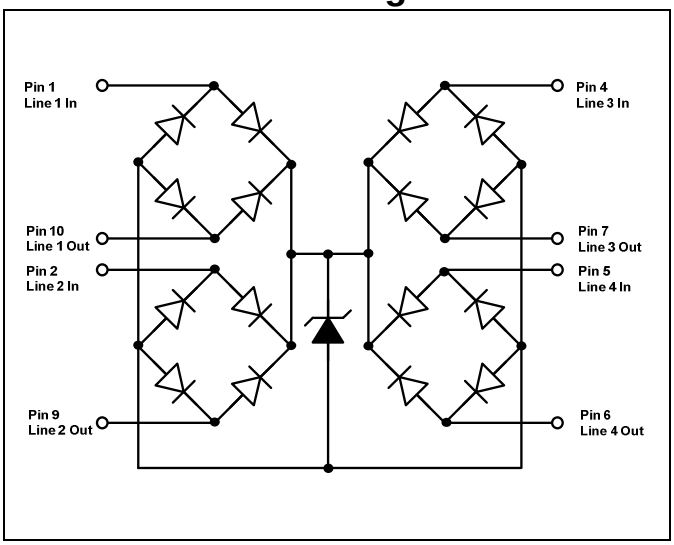
## Description

AZ3225-08F is a design which includes surge rated diode arrays to protect high speed data interfaces in an electronic system. The AZ3225-08F has been specifically designed to protect sensitive components which are connected to data and transmission lines from over-voltage damage caused by Electrostatic Discharging (ESD), Electrical Fast Transients (EFT), and Lightning.

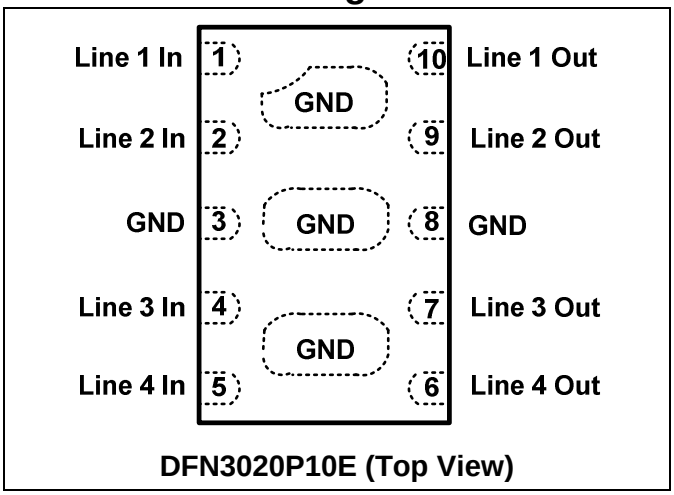
AZ3225-08F is a unique design which includes surge rated, low capacitance steering diodes and a unique design of clamping cell which is an equivalent TVS diode in a single package. During transient conditions, the proprietary clamping cells prevent over-voltage on the signal lines, protecting any downstream components.

AZ3225-08F 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




**DFN3020P10E (Top View)**

## Specifications

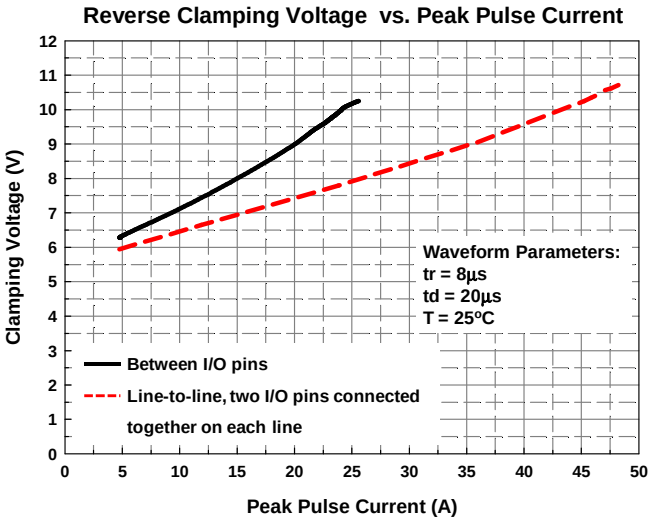
| **Absolute Maximum Ratings** ($T_A$= 25°C, unless otherwise specified) | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Rating** | **Unit** |
| Peak Pulse Current ($t_p$ =8/20μs) (Note 1) | $I_{PP}$ | 45 | A |
| ESD per IEC 61000-4-2 (Air)<br>ESD per IEC 61000-4-2 (Contact) | $V_{ESD-1}$<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 |

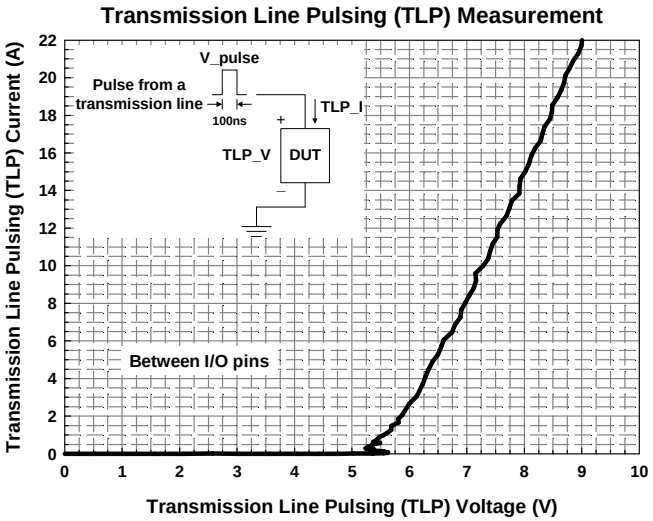
| **Electrical Characteristics** | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Condition** | **Min** | **Typ** | **Max** | **Unit** |
| Reverse Stand-Off Voltage | $V_{RWM}$ | Between I/O pins, T=25 °C. | | | 2.5 | V |
| Channel Leakage Current | $I_{Leak}$ | $V_{RWM}$ = 2.5V, T=25 °C, between I/O pins. | | | 0.5 | μA |
| Reverse Breakdown Voltage | $V_{BV}$ | $I_{BV}$ = 1mA, T=25 °C, between I/O pins. | 3 | | 7 | V |
| Surge Clamping Voltage | $V_{CL-surge}$ | $I_{PP}$=5A, $t_p$=8/20μs, T=25 °C, between I/O pins. | | | 7 | V |
| | | $I_{PP}$=25A, $t_p$=8/20μs, T=25 °C, between I/O pins. | | | 11.5 | V |
| | | $I_{PP}$=45A, $t_p$=8/20μs, T=25 °C, line-to-line, two I/O pins connected together on each line (Note 1). | | | 11.5 | V |
| ESD Clamping Voltage (Note 2) | $V_{CL-ESD}$ | IEC 61000-4-2 +8kV ($I_{TLP}$ = 16A), T=25 °C, contact mode, between I/O pins. | | 8 | | V |
| ESD Dynamic Turn-on Resistance | $R_{dynamic}$ | IEC 61000-4-2 0~+8kV, T=25 °C, contact mode, between I/O pins. | | 0.18 | | Ω |
| Channel Input Capacitance | $C_{IN}$ | $V_{IN}$ = 0V, f = 1MHz, T=25 °C, between I/O pins. | | 1.2 | 1.5 | pF |

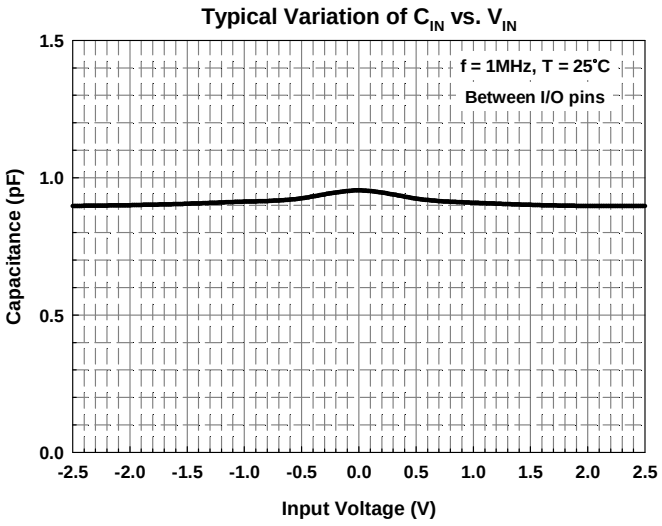
Note 1: Ratings with two pins connected together per the recommended configuration (i.e. pin-1 connected to pin-10, pin-2 connected to pin-9, pin-4 connected to pin-7, and pin-5 connected to pin-6).

Note 2: ESD Clamping Voltage was measured by Transmission Line Pulsing (TLP) System.
TLP conditions: $Z_0$= 50Ω, $t_p$= 100ns, $t_r$= 1ns.

# Typical Characteristics



## Applications Information

The AZ3225-08F is designed to protect four high speed data lines operating at 2.5 volts to against system ESD/EFT/Lightning pulses by clamping them to an acceptable reference.

The AZ3225-08F designed with a flow through pin configuration is shown in Fig. 1. Fig. 2 shows a typical PCB layout example with AZ3225-08F for ESD/EFT/Lightning protection. In the Gigabit Ethernet application, pin-1, -2, -4, and pin-5 should be connected to pin-10, -9, -7, and pin-6 respectively. The traces should be unbroken and run under the device as shown. To get minimum parasitic inductance, the path length should keep as short as possible. Pin-3, -8 and the three center tabs are electrically connected, which should be left floating (i.e. not connected to ground) in the Ethernet application. Fig. 3 shows a typical Gigabit Ethernet protection circuit with AZ3225-08F.

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 AZ3225-08F.
- Place the AZ3225-08F near the input terminals or connectors to restrict transient coupling.
- The ESD current return path should be kept as short as possible.
- NEVER route critical signals near board edges and near the lines which the ESD transience easily injects to.

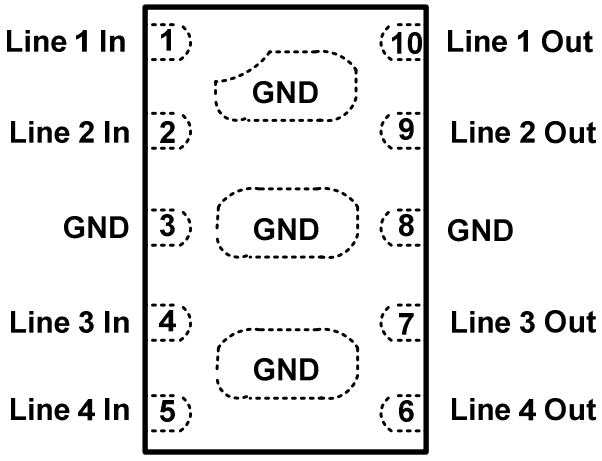



**Fig. 1 Pin configuration of AZ3225-08F.**

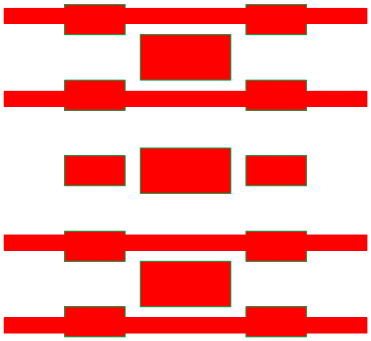


**Fig. 2 Layout example of AZ3225-08F.**

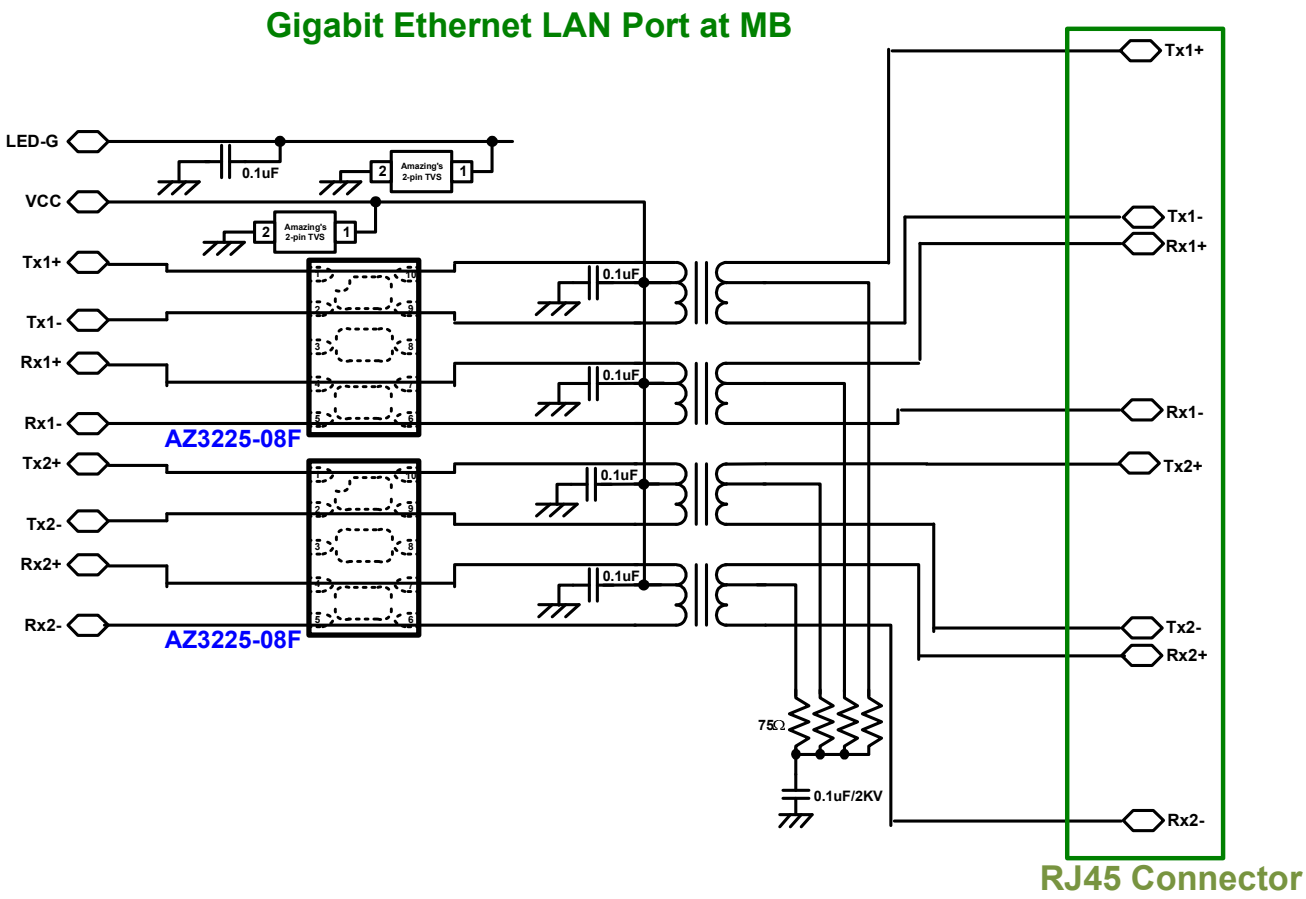
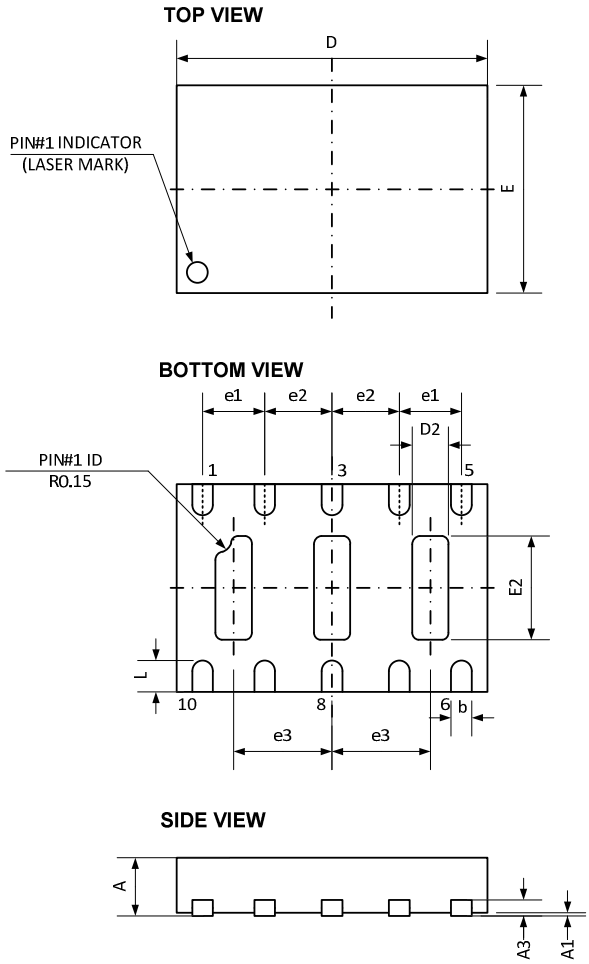



**Fig. 3**
**Gigabit Ethernet surge protection circuit with AZ3225-08F.**

## Mechanical Details

### DFN3020P10E

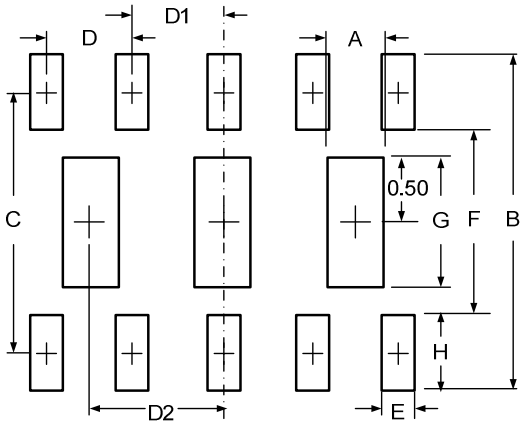
### Package Diagrams




### Package Dimensions

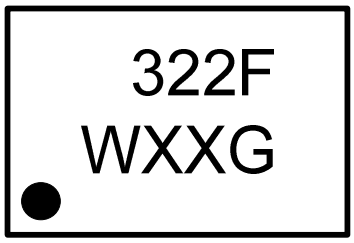
| Symbol | Millimeters | | |
|---|---|---|---|
| | Min. | Nom. | Max. |
| A | 0.510 | 0.550 | 0.600 |
| A1 | 0.000 | 0.020 | 0.050 |
| A3 | | 0.153 REF | |
| b | 0.150 | 0.200 | 0.250 |
| D | 2.900 | 3.000 | 3.100 |
| E | 1.900 | 2.000 | 2.100 |
| e1 | | 0.600 BSC | |
| e2 | | 0.650 BSC | |
| e3 | | 0.950 BSC | |
| D2 | 0.250 | 0.350 | 0.450 |
| E2 | 0.950 | 1.000 | 1.050 |
| L | 0.250 | 0.300 | 0.350 |

## Land Layout




| Dimensions | |
|---|---|
| Index | Millimeters |
| A | 0.40 |
| B | 2.56 |
| C | 1.98 |
| D | 0.60 |
| D1 | 0.65 |
| D2 | 0.95 |
| E | 0.25 |
| F | 1.40 |
| G | 1.00 |
| H | 0.58 |

## Marking Code




322F = Device Code
W = Date Code
XX = Control Code

| Part Number | Marking Code |
|---|---|
| AZ3225-08F.R7G<br>(Green Part) | 322F<br>WXXG |

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

## Ordering Information

| PN# | Material | Type | Reel size | MOQ | MOQ/internal box | MOQ/carton |
|---|---|---|---|---|---|---|
| AZ3225-08F.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 2019/11/28 | Formal Release |
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