Features

- Transient Protection for High-Speed Data Lines-to-GND and Lines-to-Lines.
- Provide Transient Protection for the Protected Lines to
  IEC 61000-4-2 (ESD) ±30kV (air/contact)
  IEC 61000-4-4 (EFT) 80A (5/50ns)
  IEC 61000-4-5 (Lightning) 25A (8/20μs)
  Cable Discharge Event (CDE)
- DFN2525P10E (2.5x2.5mm) Package.
- Specific Pin Out For Easy Board Layout.
- Fast Turn-On and Low Clamping Voltage.
- Low Capacitance (<4.2pF) for High Speed Interfaces.
- Low Operating Voltage: 3.3V.
- 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

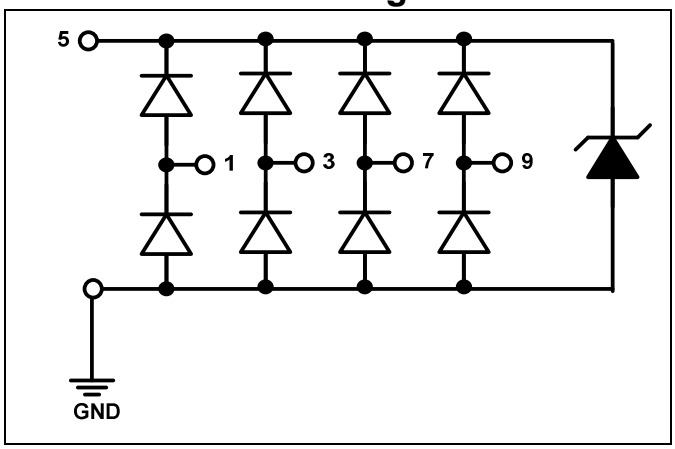
Description

AZ3133-04F is a design which includes surge rated diode arrays to protect high speed data interfaces in an electronic systems. The AZ3133-04F has been specifically designed to protect sensitive components which are connected to data and transmission lines from over-voltage damage and latch-up caused by Electrostatic Discharging (ESD), Electrical Fast Transients (EFT), Lightning, and Cable Discharge Event (CDE).

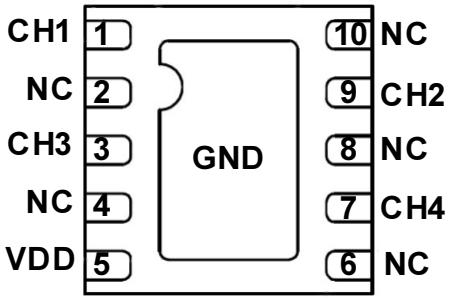
AZ3133-04F is a unique design which includes surge rated, low capacitance steering diodes and a unique design of clamping cell which is an equivalent TVS diode in a single package. During transient conditions, the steering diodes direct the transient to either the power line or to the ground line. The internal unique design of clamping cell prevents over-voltage on the power line, protecting any downstream components.

AZ3133-04F 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



DFN2525P10 (2.5x2.5mm) (Top View)

Pin Number	Description
1, 3, 7, 9	Input / Output Lines
2, 4, 6, 8, 10	No Connection
5	VDD
Center Tab	Ground

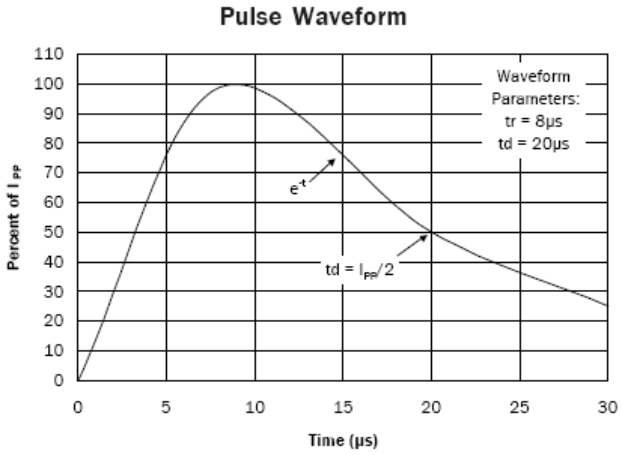
SPECIFICATIONS

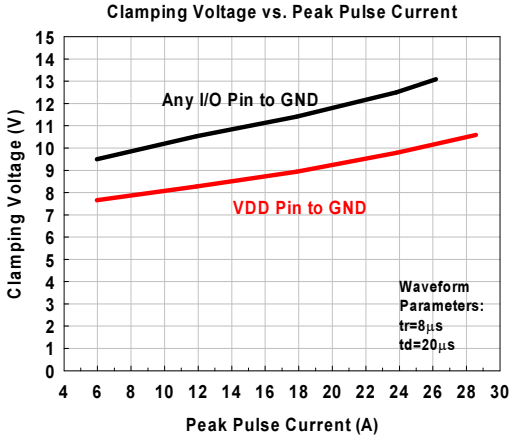
ABSOLUTE MAXIMUM RATINGS			
PARAMETER	**SYMBOL**	**RATING**	**UNITS**
Peak Pulse Current (tp =8/20us)	I_{PP}	25	A
ESD per IEC 61000-4-2 (Air/Contact)	V_{ESD}	±30	kV
Lead Soldering Temperature	T_{SOL}	260 (10 sec.)	°C
Operating Temperature	T_{OP}	-55 to +125	°C
Storage Temperature	T_{STO}	-55 to +150	°C

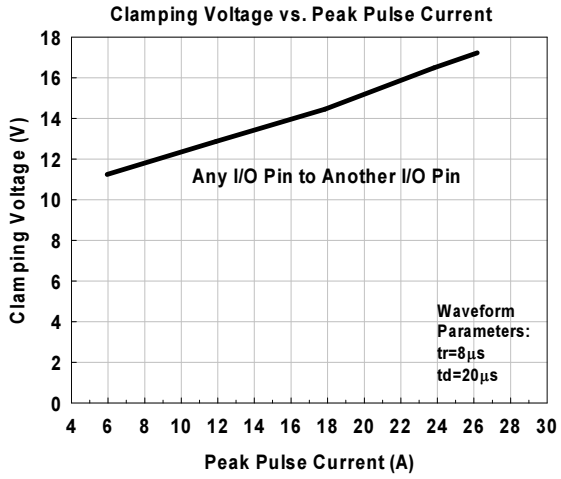
ELECTRICAL CHARACTERISTICS						
PARAMETER	**SYMBOL**	**CONDITIONS**	**MIN**	**TYP**	**MAX**	**UNITS**
Reverse Stand-Off Voltage	V_{RWM}	Pin-5 to GND, T=125 °C.			3.3	V
Reverse Leakage Current	I_{Leak}	V_{RWM} = 3.3V, T=25 °C, Pin-5 to GND			1	μA
Channel Leakage Current	I_{CH_Leak}	V_{RWM} = 3.3V, T=25 °C, Pin-1, -3, -7, -9 to GND			1	μA
Reverse Breakdown Voltage	V_{BV}	I_{BV} = 1mA, T=25 °C, Pin-5 to GND	3.9			V
Clamping Voltage	V_{CL}	I_{PP}=5A, tp=8/20us, T=25 °C. (Any I/O Pin to GND)			12	V
		I_{PP}=15A, tp=8/20us, T=25 °C. (Any I/O Pin to GND)			15	V
		I_{PP}=25A, tp=8/20us, T=25 °C. (Any I/O Pin to GND)			18	V
Channel Input Capacitance	C_{IN}	VDD = 3.3V, V_R = 0V, f = 1MHz, T=25 °C. (Any I/O Pin to GND)		3.6	4.2	pF
		VDD = 3.3V, V_R = 2.5V, f = 1MHz, T=25 °C. (Any I/O Pin to GND)		3.0	3.5	pF
		VDD = floating, V_R = 0V, f = 1MHz, T=25 °C. (Any I/O Pin to GND)		4.0	4.6	pF
		VDD = floating, V_R = 2.5V, f = 1MHz, T=25 °C. (Any I/O Pin to GND)		3.2	3.8	pF
		V_R = 0V, f = 1MHz, T=25 °C. (Between I/O Pins)		1.5	2.3	pF

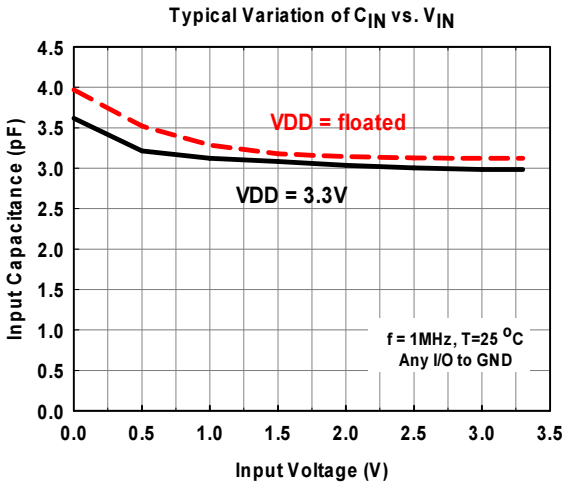
Note 1: I/O pins are pin1, pin3, pin7 and pin9.

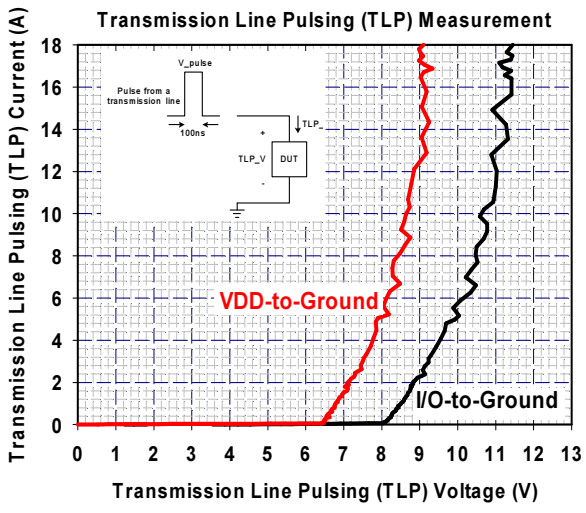
Typical Characteristics

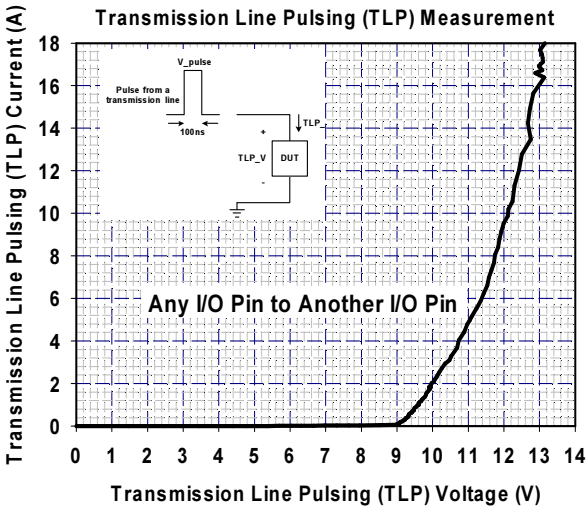












Applications Information

The AZ3133-04F is designed to protect four high speed data lines operating at 3.3 volts to against system ESD/EFT/Lightning pulses by clamping them to an acceptable reference.

The usage of the AZ3133-04F is shown in Fig. 1. Four protected data lines are connected to the ESD protection pins (pin1, pin3, pin7 and pin9) of AZ3133-04F. The center tab of AZ3133-04F can be connected directly to a ground plane for lines-to-ground and lines-to-lines protection or floating for lines-to-lines protection only. To get minimum parasitic inductance, the path length should keep as short as possible. In addition, the power pin (pin5) of AZ3133-04F can be directly connected to VDD rail of PCB (Printed Circuit Board) or floating. Pin2, pin4, pin6, pin8, and pin10 of AZ3133-04F are not connected. Fig. 2 shows a typical Gigabit Ethernet protection circuit with AZ3133-04F including lines-to-lines and lines-to-GND protection. Fig. 3 shows another Gigabit Ethernet protection circuit with AZ3133-04F to sustain higher lines-to-lines surge current.

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 AZ3133-04F.
- Place the AZ3133-04F 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.

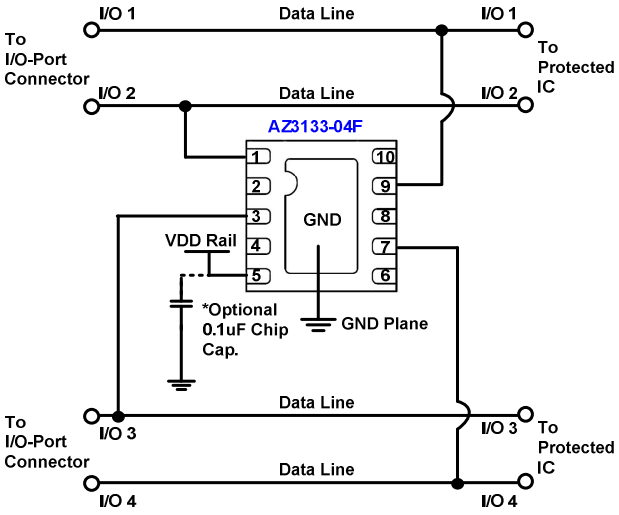


Fig. 1
Data lines and power rails connection of AZ3133-04F.

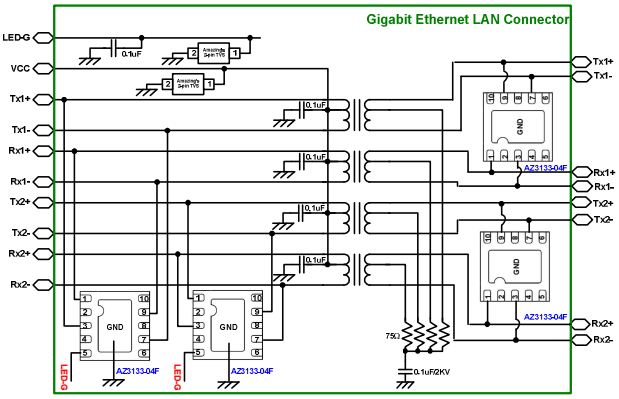


Fig. 2
Gigabit Ethernet lines-to-lines and lines-to-GND surge protection circuit with AZ3133-04F.

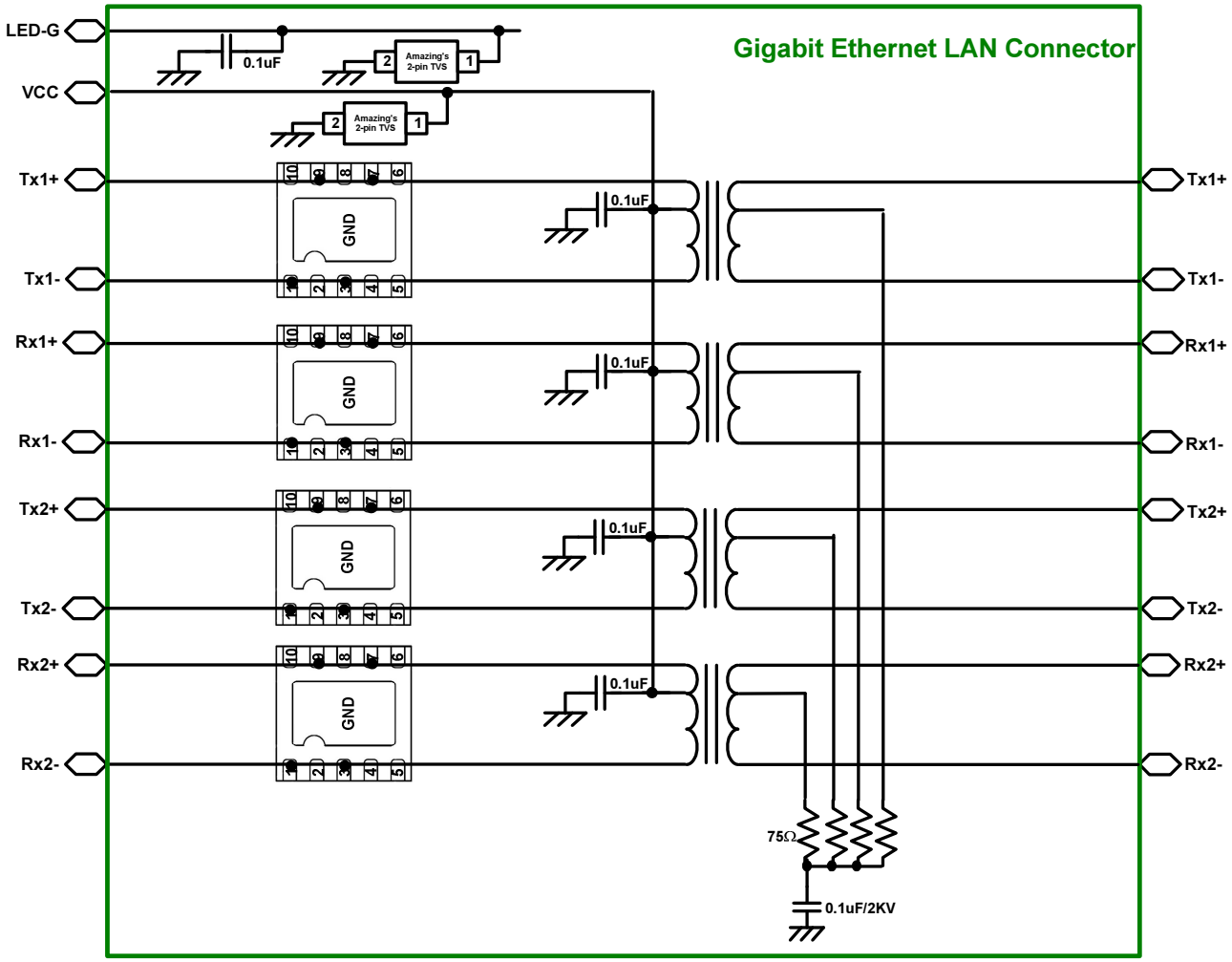
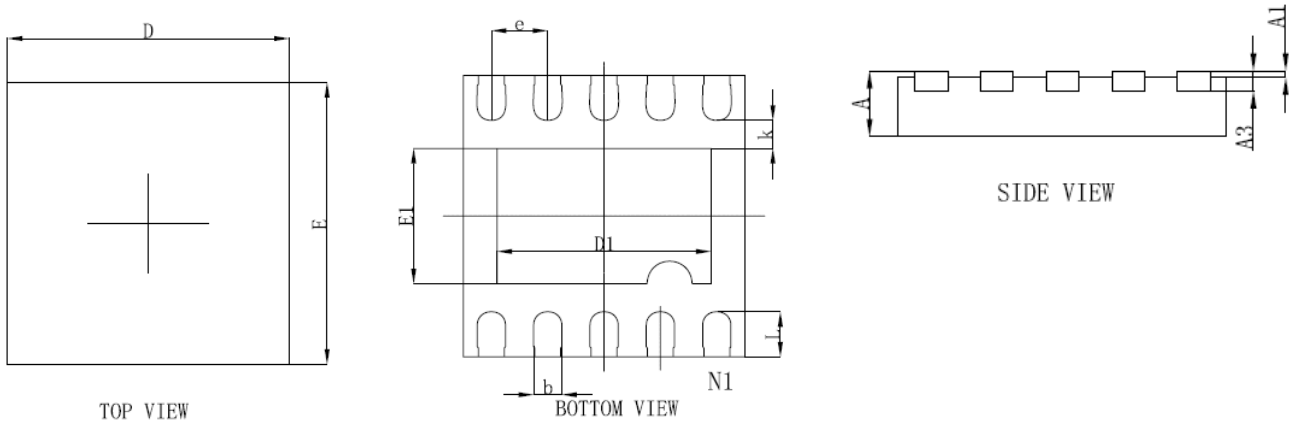


Fig. 3

Gigabit Ethernet lines-to-lines surge protection circuit with AZ3133-04F.

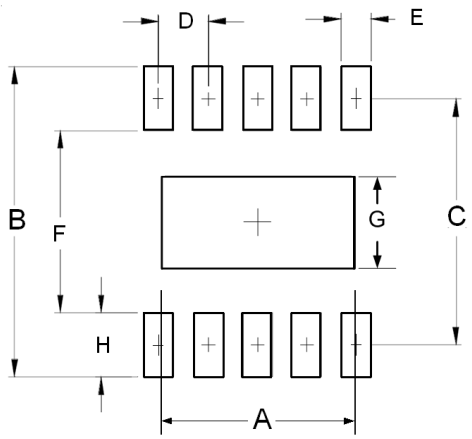
Mechanical Details

DFN2525P10E (2.5x2.5mm)
PACKAGE DIAGRAMS



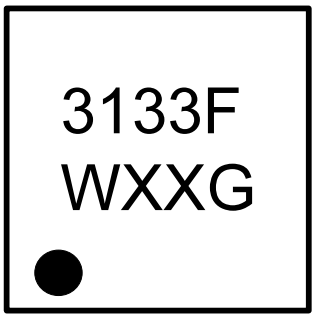
Symbol	Millimeters		Inches	
	min	max	min	max
A	0.45	0.60	0.018	0.024
A1	0.00	0.05	0.000	0.002
A3	0.152REF.		0.006 BSC	
D	2.45	2.55	0.096	0.100
E	2.45	2.55	0.096	0.100
D1	1.80	2.00	0.071	0.079
E1	1.10	1.30	0.043	0.051
b	0.20	0.30	0.008	0.012
e	0.5 BSC		0.019 BSC	
L	0.35	0.45	0.014	0.018

Land Layout



DIMENSIONS		
DIM	MILLIMETERS	INCHES
A	1.90	.075
B	3.10	.122
C	2.45	.096
D	0.50	.020
E	0.30	.012
F	1.80	.071
G	0.60	.024
H	0.65	.025

MARKING CODE



3133F = Device Code
W = Date Code
XX = Control Code

Part Number	Marking Code
AZ3133-04F (Green Part)	3133F WXXG

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

Ordering Information

PN#	Material	Package	Type	Reel size	MOQ	MOQ/internal box	MOQ/carton
AZ3133-04F.R7G	Green	DFN2525P10E	T/R	7 inch	3,000/reel	4 reel= 12,000/box	6 box =72,000/carton

Revision History

Revision	Modification Description
Revision 2013/06/28	Formal Release
Revision 2016/12/05	Add Ordering Information