

## Features

- ESD Protect for 8 high-speed I/O channels
- Provide ESD protection for each channel to **IEC 61000-4-2 (ESD)  $\pm 16\text{kV}$  (air / contact)**  
**IEC 61000-4-5 (Lightning) 6.5A (8/20 $\mu\text{s}$ )**
- For low operating voltage of 3.3V and below
- Low capacitance: 1.0pF typical
- Fast turn-on and Low clamping voltage
- Array of ESD rated diodes with internal equivalent TVS (Transient Voltage Suppression) diode
- Solid-state silicon-avalanche and active circuit triggering technology
- Simplified layout for high-speed differential signaling channels
- **Green Part**
- **AEC-Q101 qualified**

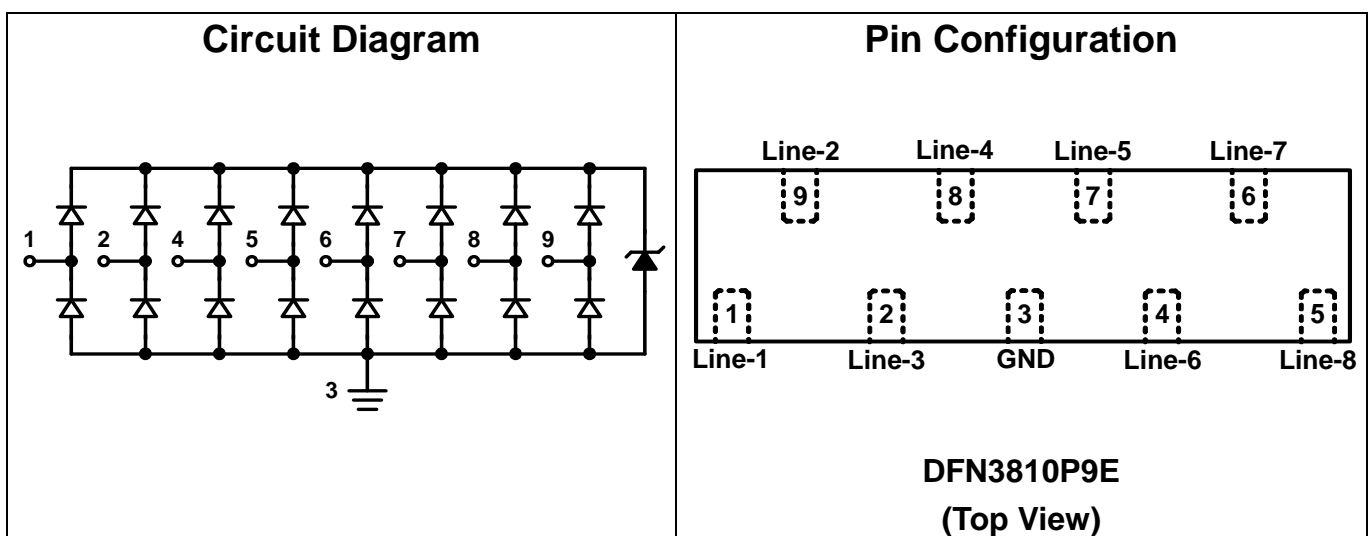
## Applications

- Video Graphics Cards
- Notebook and PC Computers
- Monitors and Flat Panel Displays
- LVDS interface
- Automotive Applications

## Description

AZ9C98-08F is a high performance and low cost design which includes surge rated diode arrays to protect high speed data interfaces. The AZ9C98-08F family has been specifically designed to protect sensitive components, which are connected to data and transmission lines, from over-voltage caused by Electrostatic Discharging (ESD) and Lightning.

AZ9C98-08F 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 steering diodes direct the transient to either the power supply line or to the ground line. The internal unique design of clamping cell prevents over-voltage on the power line, protecting any downstream components. AZ9C98-08F 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).





## SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS			
PARAMETER	SYMBOL	RATING	UNITS
Peak Pulse Current (tp = 8/20μs)	I <sub>PP</sub>	6.5	A
Operating Supply Voltage	V <sub>DC</sub>	3.6	V
ESD per IEC 61000-4-2 (Air)	V <sub>ESD</sub>	±16	kV
ESD per IEC 61000-4-2 (Contact)		±16	
Lead Soldering Temperature	T <sub>SOL</sub>	260 (10 sec.)	°C
Operating Temperature	T <sub>OP</sub>	-55 to +125	°C
Storage Temperature	T <sub>STO</sub>	-55 to +150	°C

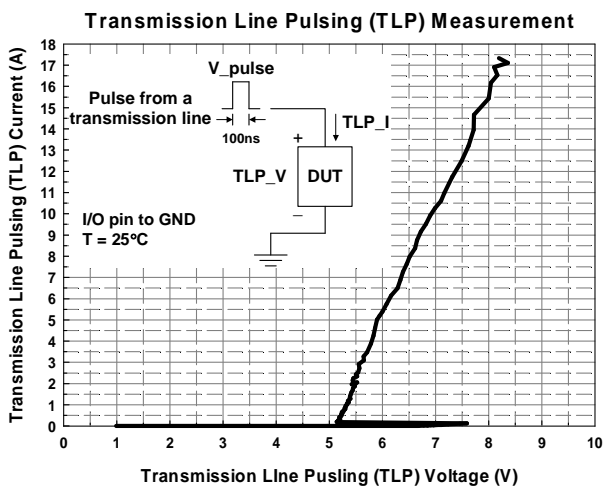
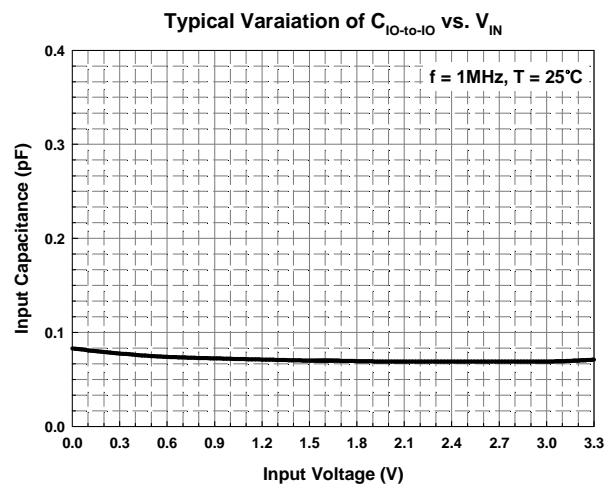
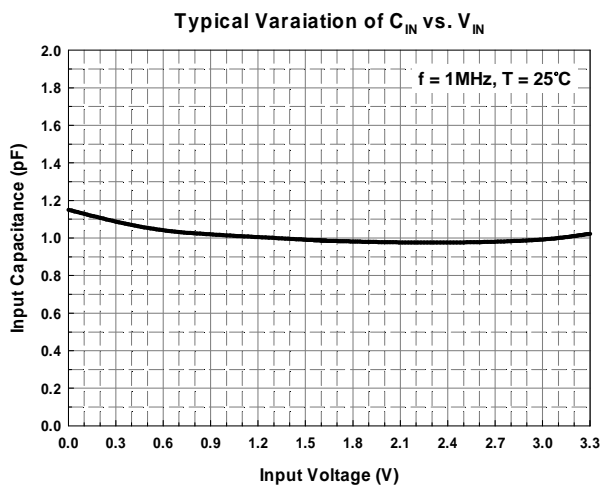
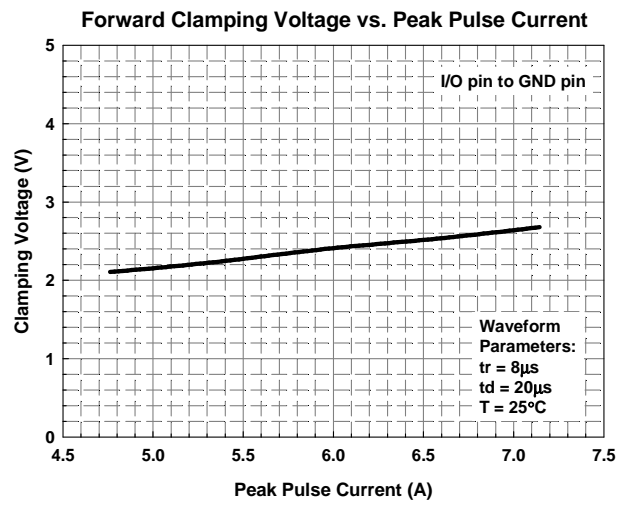
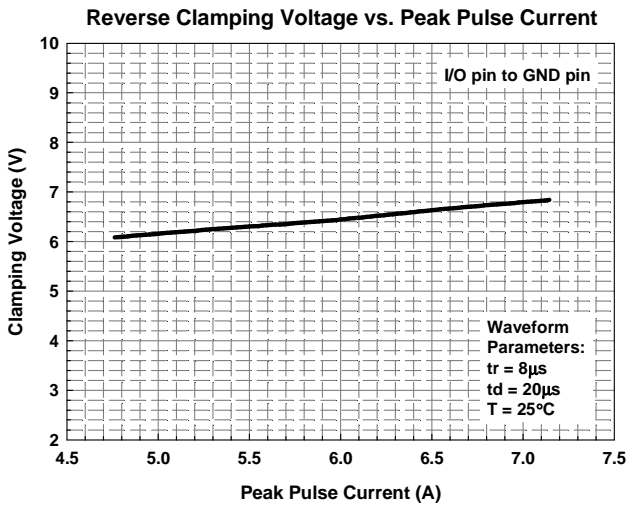
ELECTRICAL CHARACTERISTICS						
PARAMETER	SYMBOL	CONDITIONS	MINI	TYP	MAX	UNITS
Reverse Stand-Off Voltage	V <sub>RWM</sub>	Pin-1, -2, -4, -5, -6, -7, -8, -9 to pin-3, T = 25 °C.			3.3	V
Reverse Leakage Current	I <sub>CH-Leak</sub>	V <sub>Pin-1,-2,-4,-5,-6,-7,-8,-9</sub> = 3.3V, V <sub>Pin-3</sub> = 0V, T = 25 °C.			1	μA
Reverse DC Breakdown Voltage	V <sub>BV</sub>	I <sub>BV</sub> = 1mA, pin-1, -2, -4, -5, -6, -7, -8, -9 to pin-3, T = 25 °C.	4.5		7.5	V
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 15mA, pin-3 to pin-1, -2, -4, -5, -6, -7, -8, -9, T = 25 °C.	0.6		1.2	V
Surge Clamping Voltage	V <sub>CL-surge</sub>	I <sub>PP</sub> = 5A, tp = 8/20μs, T = 25 °C, I/O pin to Ground.		6.5		V
ESD Clamping Voltage (Note 1)	V <sub>clamp</sub>	IEC 61000-4-2 +8kV (I <sub>TLP</sub> = 16A), Contact mode, T = 25 °C, I/O pin to Ground.		8		V
ESD Dynamic Turn-on Resistance	R <sub>dynamic</sub>	IEC 61000-4-2 0 ~ +8kV, T = 25 °C, Contact mode, any I/O pin to Ground.		0.2		Ω
Channel Input Capacitance	C <sub>IN</sub>	V <sub>pin-3</sub> = 0V, V <sub>IN</sub> = 1.65V, f = 1MHz, T=25 °C, any I/O pin to Ground.		1.0	1.5	pF
Channel to Channel Input Capacitance	C <sub>CROSS</sub>	V <sub>pin-3</sub> = 0V, V <sub>IN</sub> = 1.65V, f = 1MHz, T=25 °C, between I/O pins.		0.1	0.15	pF

Note 1: ESD Clamping Voltage was measured by Transmission Line Pulsing (TLP) System.

TLP conditions: Z<sub>0</sub> = 50Ω, t<sub>p</sub> = 100ns, t<sub>r</sub> = 1ns.



## Typical Characteristics



## Applications Information

The AZ9C98-08F is designed to protect 8 high-speed data lines from transient over-voltage (such as ESD stress pulse). The device connection of AZ9C98-08F is shown in the Fig. 1. In Fig. 1, the 8 protected high-speed data lines are connected to the ESD protection pins (pin1, pin2, pin4, pin5, pin6, pin7, pin8, and pin9) of AZ9C98-08F. The AZ9C98-08F is designed for

allowing the traces to run straight through the device to simplify the PCB layout. The ground pin (pin3) of AZ9C98-08F is a negative reference pin. This pin should be directly connected to the GND rail of PCB. To get minimum parasitic inductance, the path length should keep as short as possible.

AZ9C98-08F can provide ESD protection for 8 I/O signal lines simultaneously. If the number of I/O signal lines is less than 8, the unused I/O pins can be simply left as NC pins.

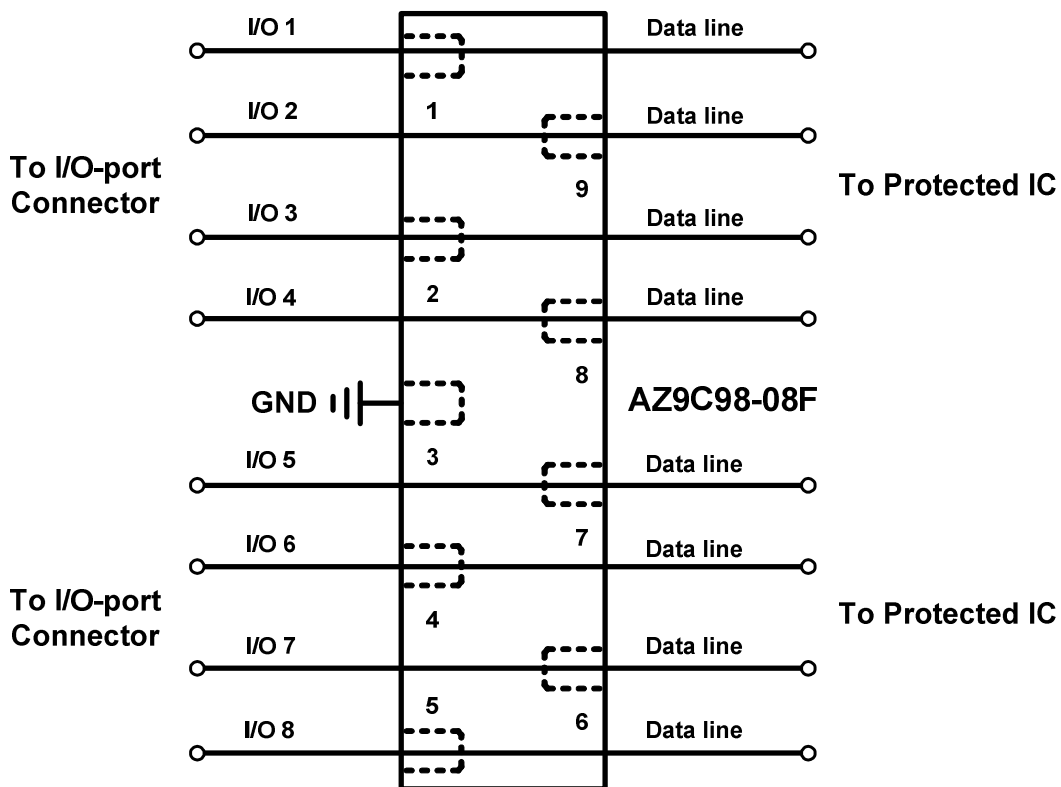
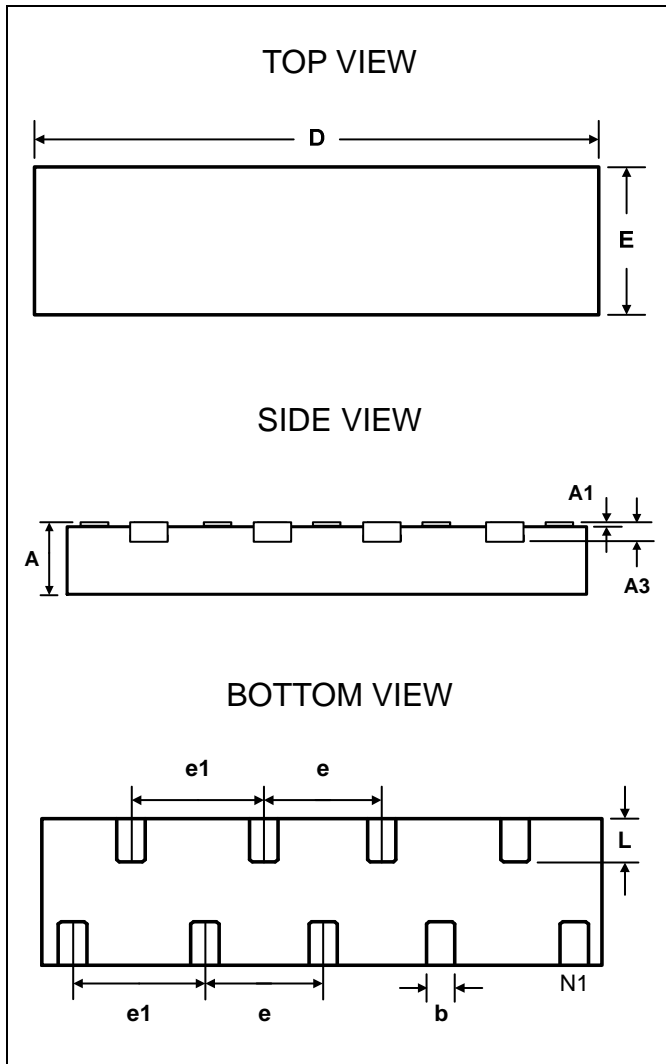


Fig. 1 Data lines connection of AZ9C98-08F.

## Mechanical Details

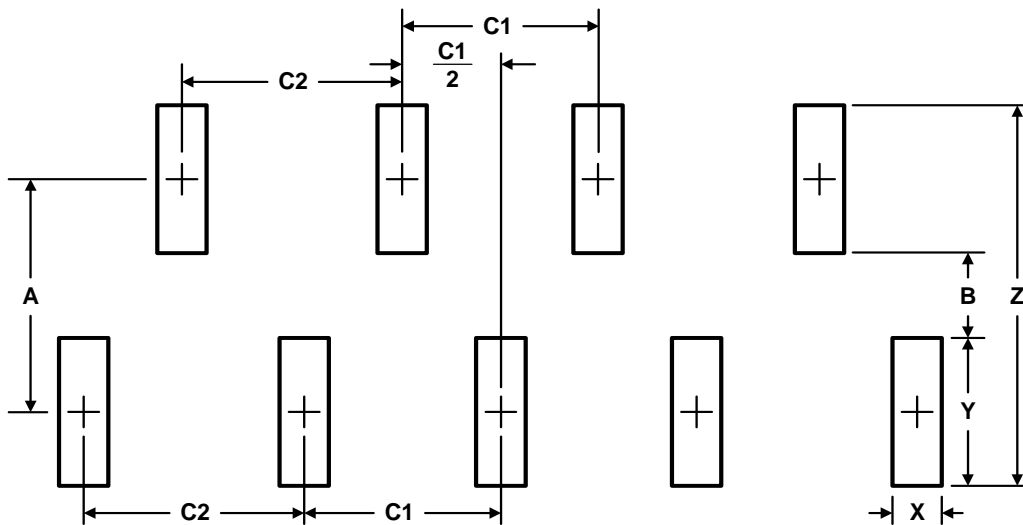
DFN3810P9E  
PACKAGE DIAGRAMS



PACKAGE DIMENSIONS

SYMBOL	Millimeters		Inches	
	Min.	Max.	Min.	Max.
<b>A</b>	0.450	0.550	0.018	0.022
<b>A1</b>	0.000	0.050	0.000	0.002
<b>A3</b>	0.150REF.		0.006REF.	
<b>D</b>	3.700	3.900	0.146	0.154
<b>E</b>	0.900	1.100	0.035	0.043
<b>b</b>	0.150	0.250	0.006	0.010
<b>e</b>	0.800TYP.		0.031TYP.	
<b>e1</b>	0.900TYP.		0.035TYP.	
<b>L</b>	0.200	0.400	0.008	0.016

## LAND LAYOUT

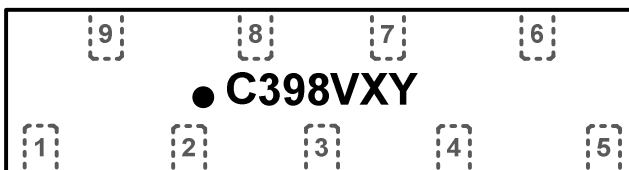


### Notes:

This LAND LAYOUT is for reference purposes only. Please consult your manufacturing partners to ensure your company's PCB design guidelines are met.

Dimensions	
Index	Millimeters
<b>A</b>	0.95
<b>B</b>	0.35
<b>C1</b>	0.80
<b>C2</b>	0.90
<b>X</b>	0.20
<b>Y</b>	0.60
<b>Z</b>	1.55

## MARKING CODE



C398V=Device Code

X=Date Code

Y=Control Code

Part Number	Marking Code
AZ9C98-08F (Green Part)	<b>C398VXY</b>

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



## Ordering Information

PN#	Material	Type	Reel size	MOQ	MOQ/internal box	MOQ/carton
AZ9C98-08F.R7G	Green	T/R	7 inch	3,000/reel	3 reel = 9,000/box	6 box = 54,000/carton

## Revision History

Revision	Modification Description
Revision 2015/01/30	Preliminary release.
Revision 2015/02/03	Update the ordering information.
Revision 2015/11/06	Formal release.