



## Features

- ESD Protect for 8 high-speed I/O channels
- Provide ESD protection for each channel to **IEC 61000-4-2 (ESD) ±15kV (air), ±12kV (contact)**
- **For low operating voltage of 3.3V and below**
- **Ultra low capacitance: 0.5pF 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

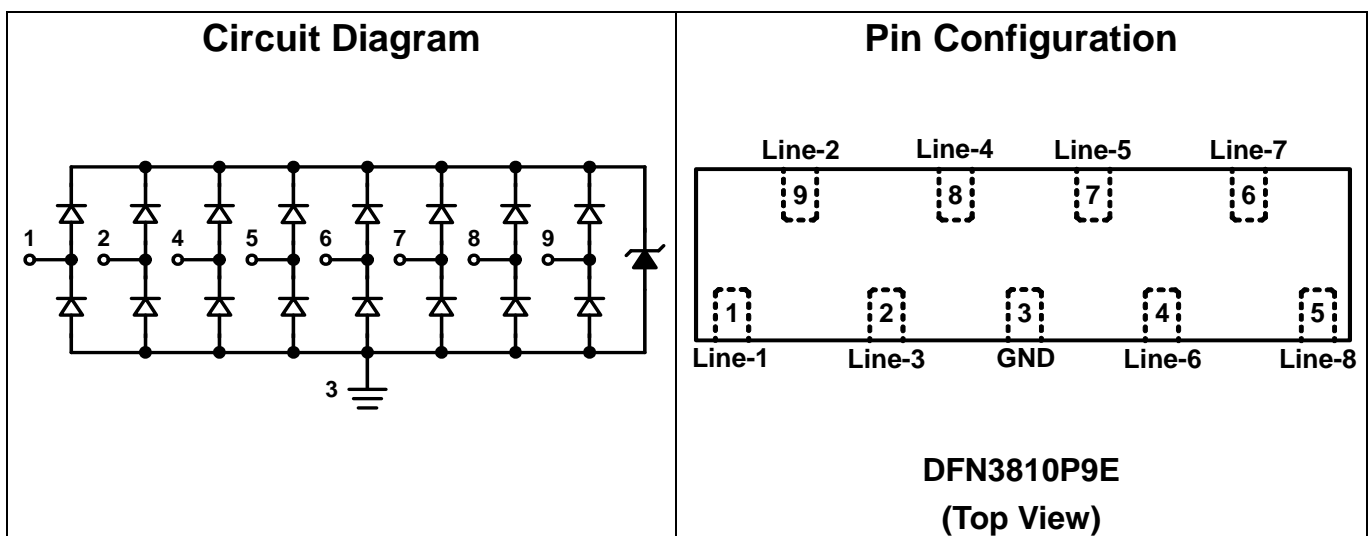
- HDMI 1.3, 1.4 and 2.0 version
- DisplayPort interface
- SATA and eSATA interface
- V-By-One
- LVDS interfaces
- Ethernet port: 10/100/1000 Mb/s
- Automotive Applications

## Description

AZ9143-08F is a design which includes ESD rated clamping cell arrays to protect high speed data interfaces. The AZ9143-08F has been specifically designed to protect sensitive components which are connected to data and transmission lines from over-voltage caused by Electrostatic Discharging (ESD).

AZ9143-08F is a unique design which includes ESD rated, ultra 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 internal ESD line or ground line. The internal unique design of clamping cell prevents over-voltage on the internal ESD line and on the I/O line, which is protecting any downstream components.

AZ9143-08F may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 (±15kV air, ±8kV contact discharge).





## SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS			
PARAMETER	SYMBOL	RATING	UNITS
Operating Supply Voltage (I/O pin – GND)	$V_{DC}$	3.6	V
ESD per IEC 61000-4-2 (Air)	$V_{ESD-1}$	±15	kV
ESD per IEC 61000-4-2 (Contact)	$V_{ESD-2}$	±12	
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	MINI	TYP	MAX	UNITS
Reverse Stand-Off Voltage	$V_{RWM}$	Pin-1, -2, -4, -5, -6, -7, -8, -9 to pin-3, $T=25\text{ }^{\circ}\text{C}$ .			3.3	V
Reverse Leakage Current	$I_{CH-Leak}$	$V_{Pin-1,-2,-4,-5,-6,-7,-8,-9} = 3.3\text{V}$ , $V_{Pin-3} = 0\text{V}$ , $T=25\text{ }^{\circ}\text{C}$ .			1	$\mu\text{A}$
Reverse Breakdown Voltage	$V_{BV}$	$I_{BV} = 1\text{mA}$ , pin-1, -2, -4, -5, -6, -7, -8, -9 to pin-3, $T=25\text{ }^{\circ}\text{C}$ .	4.5			V
Forward Voltage	$V_F$	$I_F = 15\text{mA}$ , pin-3 to pin-1, -2, -4, -5, -6, -7, -8, -9, $T=25\text{ }^{\circ}\text{C}$ .	0.6		1.2	V
ESD Clamping Voltage (Note 1)	$V_{clamp}$	IEC 61000-4-2 +8kV ( $I_{TLP} = 16\text{A}$ ), Contact mode, any I/O pin to Ground, $T=25\text{ }^{\circ}\text{C}$ .		9		V
ESD Dynamic Turn-on Resistance	$R_{dynamic}$	IEC 61000-4-2 0~+8kV, $T=25\text{ }^{\circ}\text{C}$ , Contact mode, any I/O pin to Ground.		0.23		$\Omega$
Channel Input Capacitance	$C_{IN}$	$V_{pin-3} = 0\text{V}$ , $V_{IN} = 1.65\text{V}$ , $f = 1\text{MHz}$ , $T=25\text{ }^{\circ}\text{C}$ , any I/O pin to Ground.		0.5	0.65	pF
Channel to Channel Input Capacitance	$C_{CROSS}$	$V_{pin-3} = 0\text{V}$ , $V_{IN} = 1.65\text{V}$ , $f = 1\text{MHz}$ , $T=25\text{ }^{\circ}\text{C}$ , between I/O pins.		0.04	0.08	pF

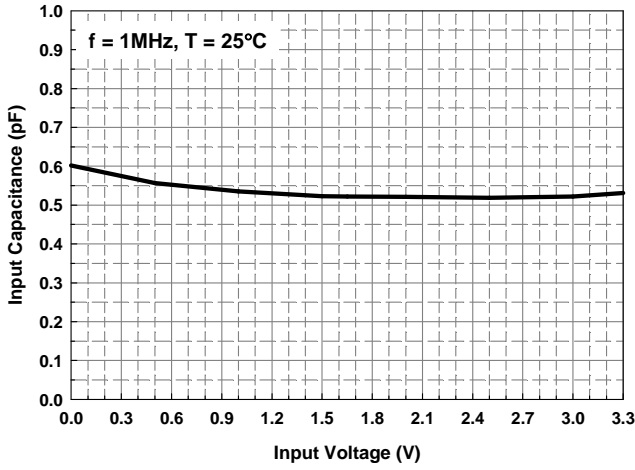
Note 1: ESD Clamping Voltage was measured by Transmission Line Pulsing (TLP) System.

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

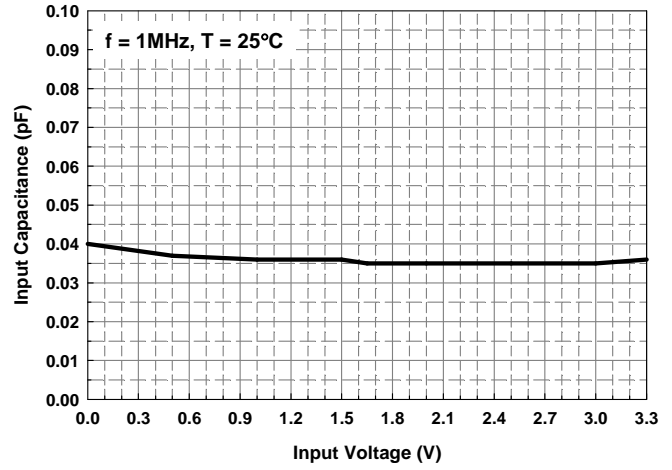


## Typical Characteristics

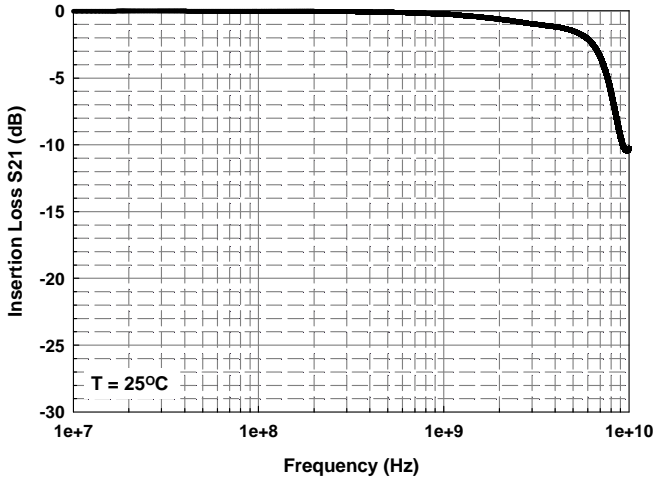
Typical Variation of  $C_{IN}$  vs.  $V_{IN}$



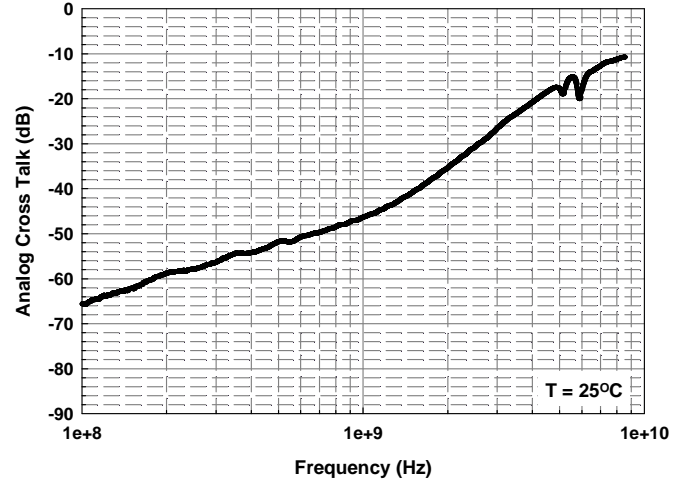
Typical Variation of  $C_{IO-to-IO}$  vs.  $V_{IN}$



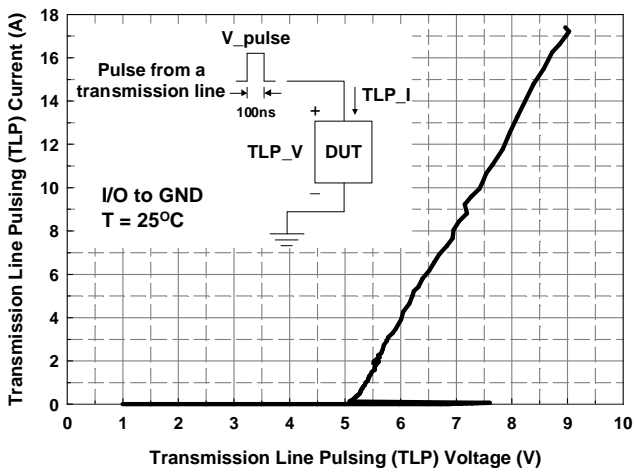
Insertion Loss  $S_{21}$  (I/O-to-GND)



Analog Cross Talk



Transmission Line Pulsing (TLP) Measurement



## Applications Information

The AZ9143-08F is designed to protect 8 high-speed data lines from transient over-voltage (such as ESD stress pulse). The device connection of AZ9143-08F 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 AZ9143-08F. The AZ9143-08F is designed for

allowing the traces to run straight through the device to simplify the PCB layout. The ground pin (pin3) of AZ9143-08F 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.

AZ9143-08F 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.

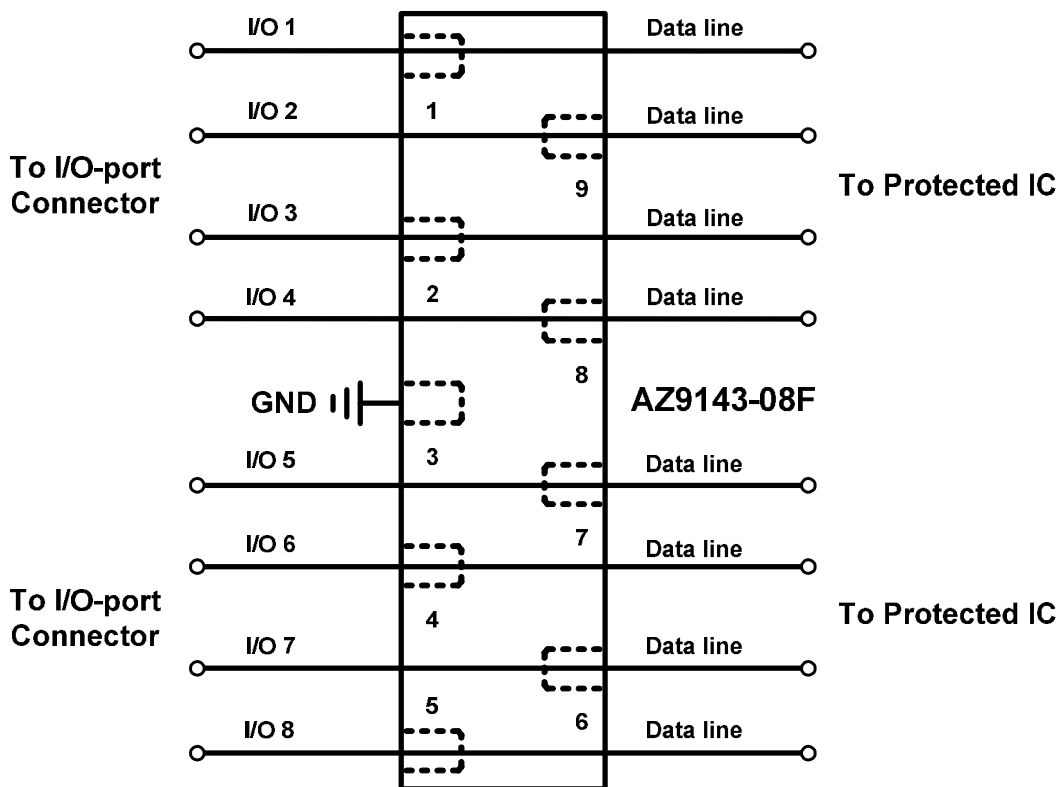
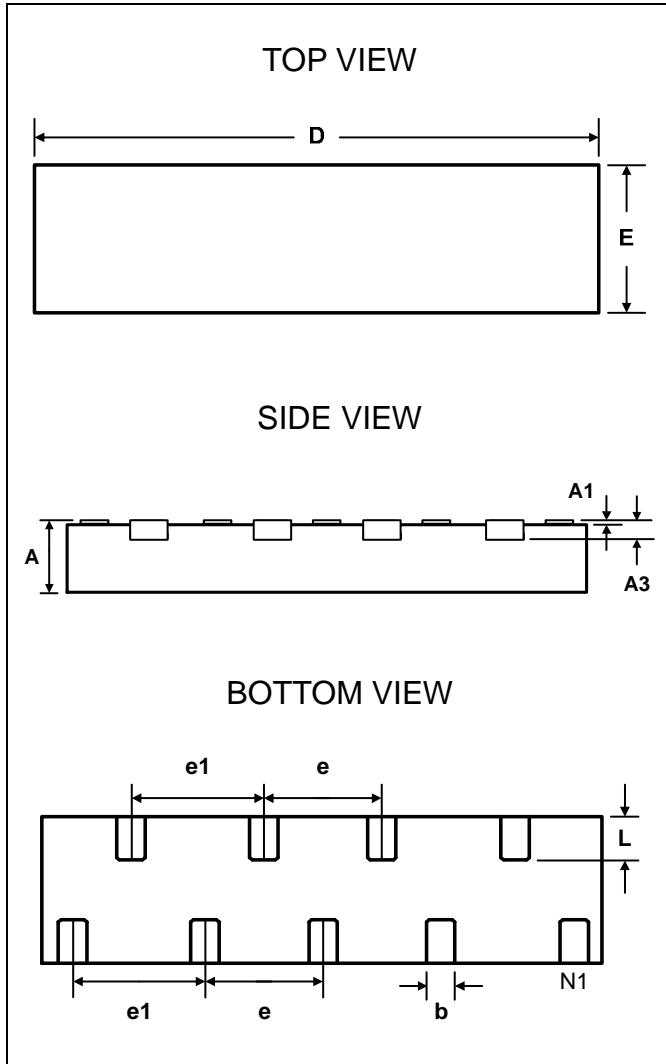


Fig. 1 Data lines connection of AZ9143-08F.



## Mechanical Details

DFN3810P9E  
PACKAGE DIAGRAMS

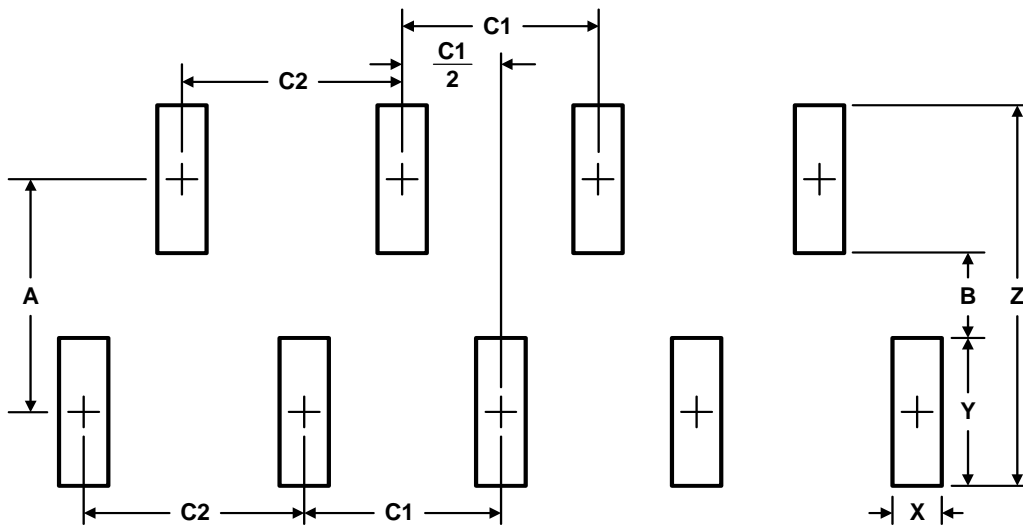


PACKAGE DIMENSIONS

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

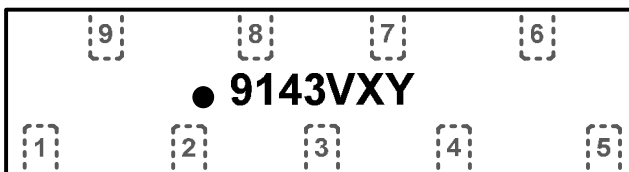


### Notes:

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



9143V=Device Code

X=Date Code

Y=Control Code

Part Number	Marking Code
AZ9143-08F (Green Part)	<b>9143VXY</b>

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



## Ordering Information

PN#	Material	Type	Real Size	MOQ	MOQ / internal box	MOQ / carton
AZ9143-08F.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 2015/02/11	Preliminary release.
Revision 2015/10/19	Formal release.