AOZ8906

Ultra-Low Capacitance TVS Diode Array

General Description

The AOZ8906 is a transient voltage suppressor array designed to protect high speed data lines such as HDMI, USB 2.0, MDDI, SATA, and Gigabit Ethernet from damaging ESD events.

This device incorporates eight surge rated, low capacitance steering diodes and a TVS in a single package. During transient conditions, the steering diodes direct the transient to either the positive side of the power supply line or to ground.

The AOZ8906 provides a typical line to line capacitance of 1pF making it ideally suited for HDMI 1.3 or USB 2.0 applications, such as Digital TVs,
DVD players, Computing, set-top boxes and MDDI applications in mobile computing devices.

The AOZ8906 comes in RoHS compliant and halogen free SOT23-6L package and is rated -40°C to +85°C junction temperature range.

Features

- ESD protection for high-speed data lines:
  - IEC 61000-4-2, level 4 (ESD) immunity test
  - ±30kV (air discharge) and ±30kV (contact discharge)
  - IEC61000-4-4 (EFT) 40A (5/50nS)
  - IEC61000-4-5 (Lightning) 7A (8/20µS)
  - Human Body Model (HBM) ±30kV
- Array of surge rated diodes with internal TVS diode
- Protects four I/O lines
- Low capacitance between I/O lines: 1pF
- Low clamping voltage
- Low operating voltage: 5.0V

Applications

- HDMI, USB 2.0, MDDI, SATA ports
- Monitors and flat panel displays
- Set-top box
- Video graphics cards
- Notebook computers

Green Product

Typical Application

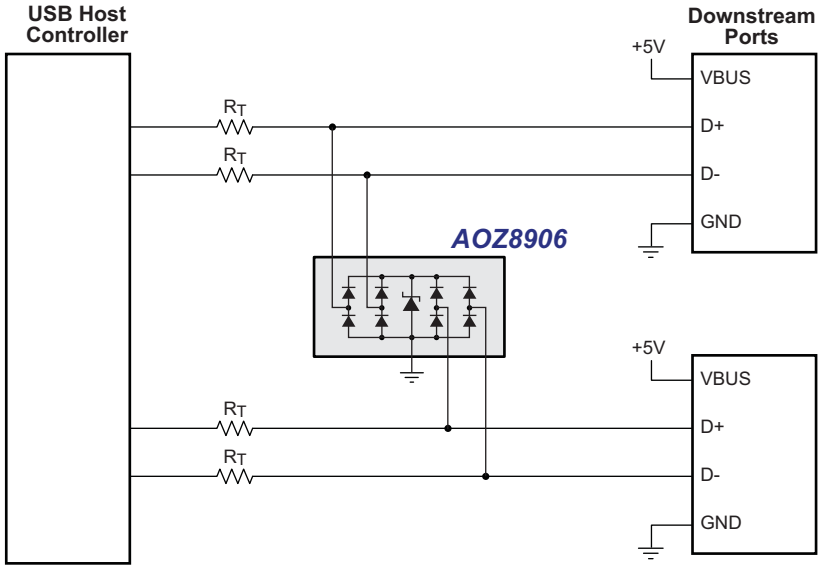


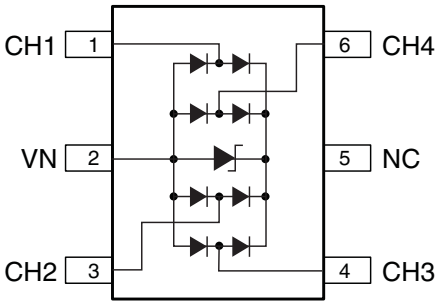
Figure 1. USB High Speed Ports

Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ8906CI	-40°C to +85°C	SOT23-6L	RoHS Compliant Green Product

AOS Green Products use reduced levels of Halogens, and are also RoHS compliant.
Please visit www.aosmd.com/media/AOSGreenPolicy.pdf for additional information.

Pin Configuration



SOT23-6
(Top View)

Absolute Maximum Ratings

Exceeding the Absolute Maximum ratings may damage the device.

Parameter	Rating
Storage Temperature (T_S)	-65°C to +150°C
ESD Rating per IEC61000-4-2, contact(1)	±30kV
ESD Rating per IEC61000-4-2, air(1)	±30kV
ESD Rating per Human Body Model(2)	±30kV

Notes:
1. IEC 61000-4-2 discharge with $C_{Discharge}$ = 150pF, $R_{Discharge}$ = 330Ω.
2. Human Body Discharge per MIL-STD-883, Method 3015 $C_{Discharge}$ = 100pF, $R_{Discharge}$ = 1.5kΩ.

Maximum Operating Ratings

Parameter	Rating
Junction Temperature (T_J)	-40°C to +125°C

Electrical Characteristics

T_A = 25°C unless otherwise specified.

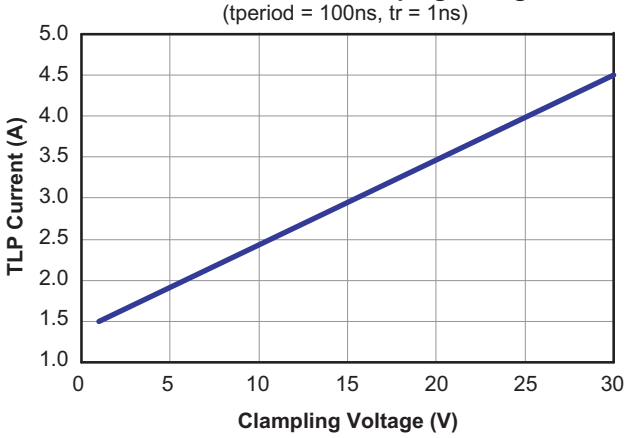
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{RWM}	Reverse Working Voltage	Between I/O and VN(3)			5.5	V
V_{BR}	Reverse Breakdown Voltage	I_T = 100µA, between I/O and VN(4)	6.6			V
I_R	Reverse Leakage Current	V_{RWM} = 5V, between I/O and VN			1.0	µA
V_F	Diode Forward Voltage	I_F = 15mA	0.7	0.85	1.0	V
V_{CL}	Channel Clamp Voltage Positive Transients Negative Transients	I_{PP} = 16A, tp = 100ns, any I/O pin to Ground(5)			 4.1 -5.3	V
	Channel Clamp Voltage Positive Transients Negative Transients	I_{PP} = 30A, tp = 100ns, any I/O pin to Ground(5)			 5.2 -9.9	V
	Channel Clamp Voltage Any I/O Pin to Ground	I_{PP} = 7A, tp = 8/20µs			 8	V
C_j	Channel Input Capacitance	V_R = 0V, f = 1MHz, any I/O pin to Ground		1.0	1.5	pF
		V_R = 0V, f = 1MHz, between I/O pins		0.5	0.8	pF
R_{DYN}	Dynamic Resistance	I_{TLP} = 16A to 30A		0.15		Ω
		I_{TLP} = -16A to -30A		0.3		Ω

Notes:

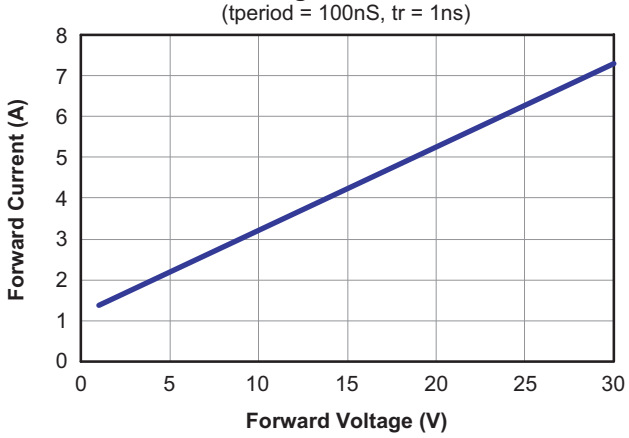
3. The working peak reverse voltage, V_{RWM}, should be equal to or greater than the DC or continuous peak operating voltage level.
4. V_{BR} is measured at the pulse test current I_T.
5. Measurements performed using a 100ns Transmission Line Pulse (TLP) system.

Typical Performance Characteristics

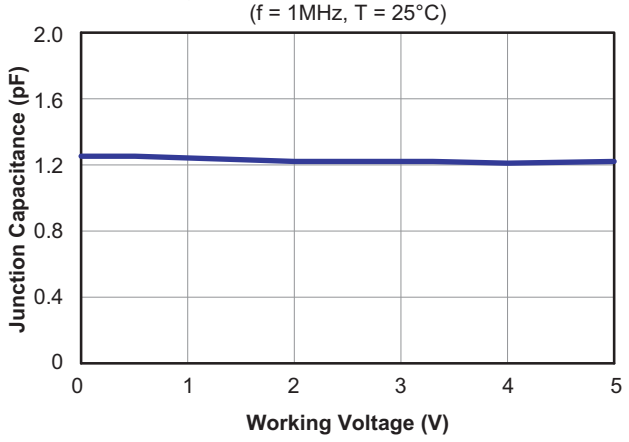
TLP Current vs. Clamping Voltage
(tperiod = 100ns, tr = 1ns)



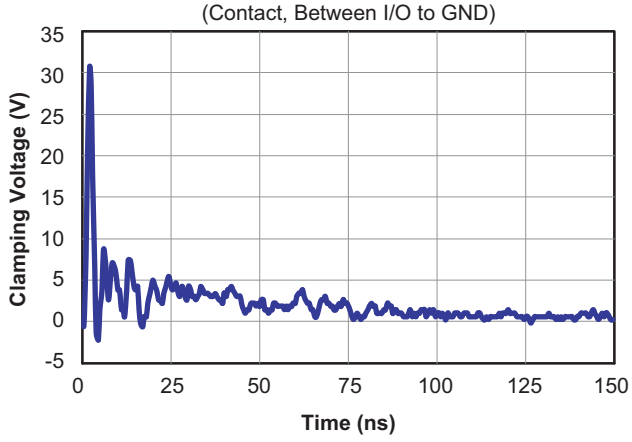
Forward Voltage vs. Forward Current
(tperiod = 100nS, tr = 1ns)



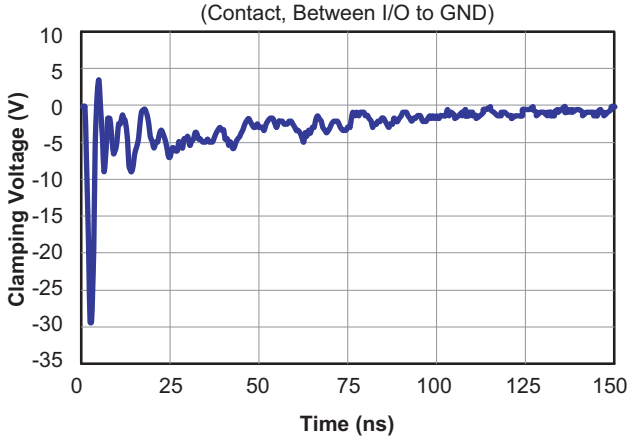
Typical Variation of CIN vs. VR
(f = 1MHz, T = 25°C)



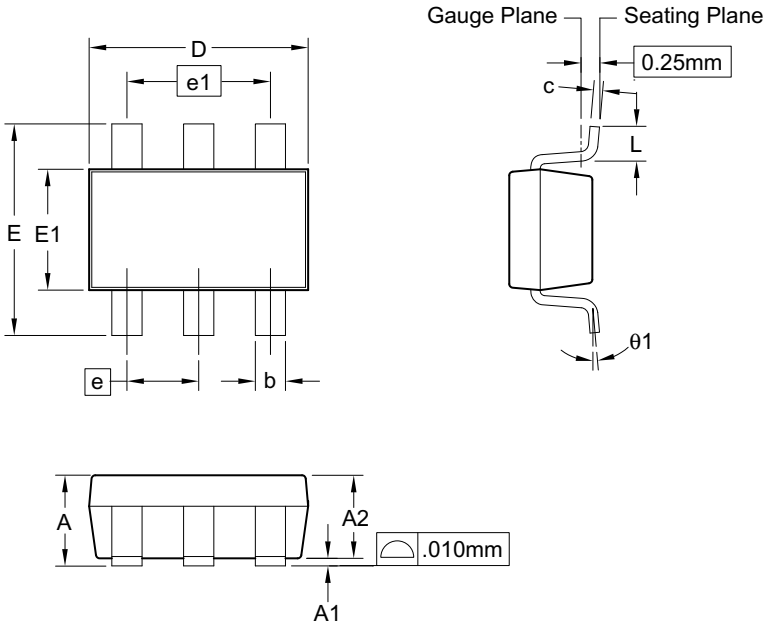
+8kV ESD Clamping Per IEC 61000-4-2
(Contact, Between I/O to GND)



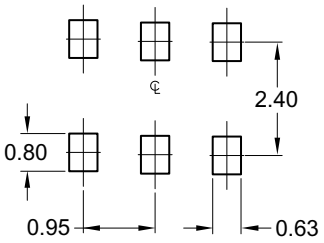
-8kV ESD Clamping Per IEC 61000-4-2
(Contact, Between I/O to GND)



Package Dimensions, SOT23-6L



RECOMMENDED LAND PATTERN



UNIT: mm

Dimensions in millimeters

Symbols	Min.	Nom.	Max.
A	0.90	—	1.25
A1	0.00	—	0.15
A2	0.80	1.10	1.20
b	0.30	0.40	0.50
c	0.08	0.13	0.20
D	2.70	2.90	3.10
E	2.50	2.80	3.10
E1	1.50	1.60	1.70
e	0.95 BSC		
e1	1.90 BSC		
L	0.30	—	0.60
θ1	0°	—	8°

Dimensions in inches

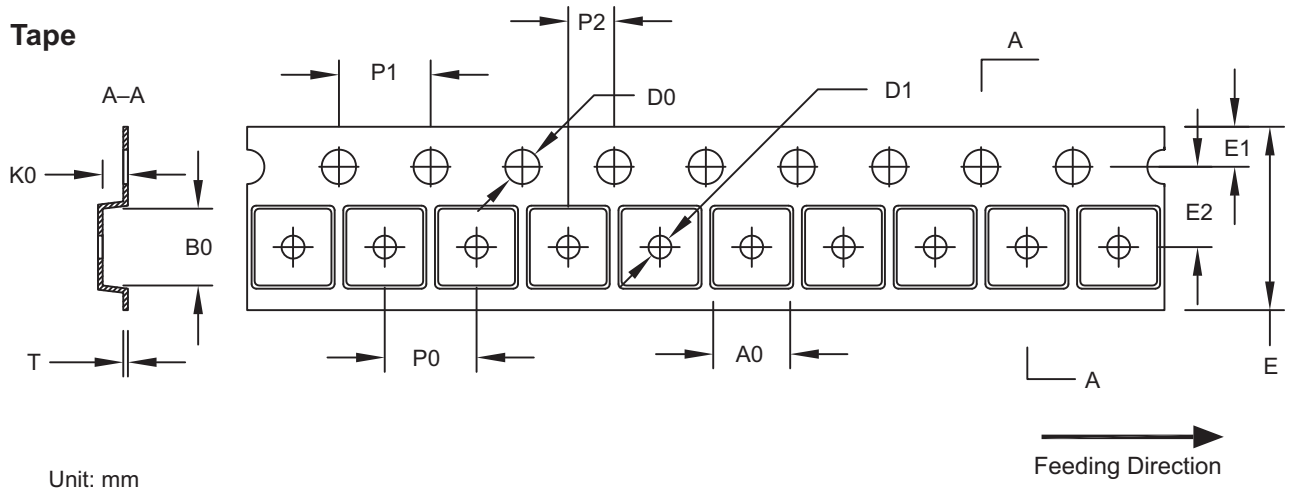
Symbols	Min.	Nom.	Max.
A	0.035	—	0.049
A1	0.00	—	0.006
A2	0.031	0.043	0.047
b	0.012	0.016	0.020
c	0.003	0.005	0.008
D	0.106	0.114	0.122
E	0.098	0.110	0.122
E1	0.059	0.063	0.067
e	0.037 BSC		
e1	0.075 BSC		
L	0.012	—	0.024
θ1	0°	—	8°

Notes:

1. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils each.
2. Dimension “L” is measured in gauge plane.
3. Tolerance ±0.100mm (4 mil) unless otherwise specified.
4. Followed from JEDEC MO-178C & MO-193C.
6. Controlling dimension is millimeter. Converted inch dimensions are not necessarily exact.

Tape and Reel Dimensions, SOT23-6L

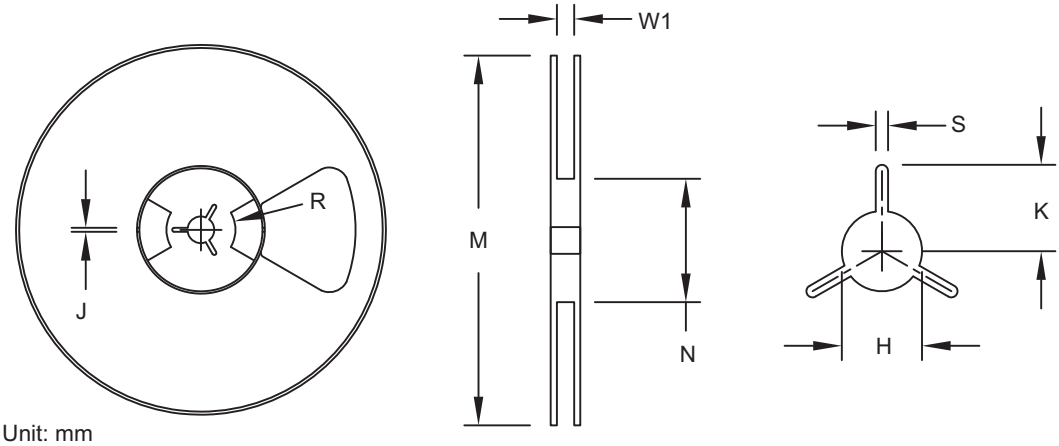
Tape



Unit: mm

Package	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SOT-23	3.15 ±0.10	3.20 ±0.10	1.40 ±0.10	1.50 ±0.05	1.00 ±0.10/-0.0	8.00 ±0.30	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.23 ±0.03

Reel

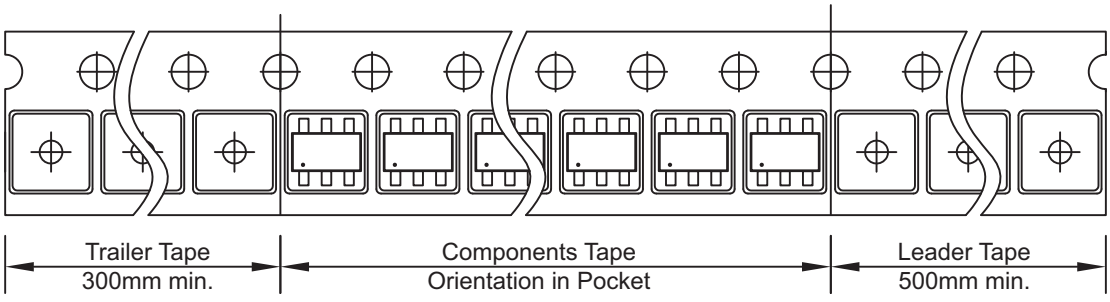


Unit: mm

Tape Size	Reel Size	M	N	W1	H	S	K	R	J
8 mm	ø177.80	ø177.80 MAX.	ø55.00 MIN.	8.40 +1.50/-0.00	ø13.00 +0.50 / -0.20	1.50 MIN.	10.10 MIN.	12.70	4.00 +0.10/-0.10

Leader/Trailer and Orientation

Unit Per Reel: 3000pcs



Package Marking

AOZ8906CI
(SOT-23)