ALPHA & OMEGA SEMICONDUCTOR

AOZ8231A

One-line Bi-directional TVS Diode

General Description

The AOZ8231A is a one-line bi-directional transient voltage suppressor diode designed to protect voltage sensitive electronics from high transient conditions and ESD.

This device incorporates one TVS diode in an ultra-small DFN 1006 package. It may be used to meet the ESD immunity requirements of EC 61000-4-2, Level 4 (±15kV air, ±8kV contact discharge).

The AOZ8231A comes in a RoHS compliant, Halogen-Free DFN 1.0 mm x 0.6 mm package and is rated over a -40 °C to +85 °C ambient temperature range.

The ultra-small 1.0 mm x 0.6 mm x 0.5 mm DFN package makes it ideal for applications where PCB space is a premium. The small size and high ESD protection makes it ideal for protecting voltage sensitive electronics from high transient conditions and ESD.

Applications

- Portable handheld devices
- Keypads, data lines, buttons
- Notebook computers
- Digital Cameras
- Portable GPS
- MP3 players

Features

- ESD protection for high-speed data lines

  AOZ8231ADI-02:
  - Exceeds: IEC 61000-4-2 (ESD) ± 30 kV (air), ± 30 kV (contact)
  - Human Body Model (HBM) ± 30 kV
  - IEC 61000-4-5 (Lightning) 6 A (8/20 µS)
  - IEC 61000-4-4 (EFT) 40 A

  AOZ8231ADI-03:
  - Exceeds: IEC 61000-4-2 (ESD) ± 30 kV (air), ± 30 kV (contact)
  - Human Body Model (HBM) ± 30 kV
  - IEC 61000-4-5 (Lightning) 6 A (8/20 µS)
  - IEC 61000-4-4 (EFT) 40 A

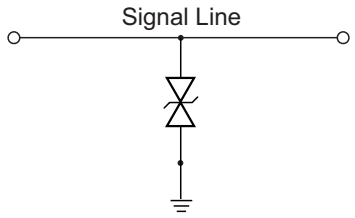
  AOZ8231ADI-05:
  - Exceeds: IEC 61000-4-2 (ESD) ± 30 kV (air), ±30 kV (contact)
  - Human Body Model (HBM) ± 30 kV
  - IEC 61000-4-5 (Lightning) 5 A (8/20 µS)
  - IEC 61000-4-4 (EFT) 40 A

  AOZ8231ADI-08:
  - Exceeds: IEC 61000-4-2 (ESD) ± 30 kV (air), ± 30 kV (contact)
  - Human Body Model (HBM) ± 30 kV
  - IEC 61000-4-5 (Lightning) 5 A (8/20 µS)
  - IEC 61000-4-4 (EFT) 40 A

  AOZ8231ADI-12:
  - Exceeds: IEC 61000-4-2 (ESD) ± 30 kV (air), ± 30 kV (contact)
  - Human Body Model (HBM) ± 30 kV
  - IEC 61000-4-5 (Lightning) 4 A (8/20 µS)
  - IEC 61000-4-4 (EFT) 40 A

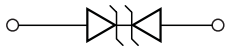
  AOZ8231ADI-24:
  - Exceeds: IEC 61000-4-2 (ESD) ± 18 kV (air), ± 15 kV (contact)
  - Human Body Model (HBM) ± 15 kV
  - IEC 61000-4-5 (Lightning) 2.5 A (8/20 µS)
  - IEC 61000-4-4 (EFT) 40 A
- Small package saves board space
- Low insertion loss
- Low clamping voltage
- Low operating voltage
- Pb-free device

Typical Application



Bidirection Protection of Single Line

Pin Configuration



Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ8231ADI-02	-40 °C to +85 °C	DFN 1.0 x 0.6	Green Product
AOZ8231ADI-03			
AOZ8231ADI-05			
AOZ8231ADI-08			
AOZ8231ADI-12			
AOZ8231ADI-24			

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

Absolute Maximum Ratings

Exceeding the Absolute Maximum ratings may damage the device.

Parameter	Rating for AOZ8231ADI					
	-02	-03	-05	-08	-12	-24
VP – VN	2.5 V	3.3 V	5 V	8 V	12 V	24 V
Peak Pulse Current, t_P = 8/20 µs	6 A	6 A	5 A	5 A	4 A	2.5 A
Storage Temperature (T_S)	-65 °C to +150 °C					
ESD Rating per IEC61000-4-2, Contact(1)	± 30 kV	± 30 kV	± 30 kV	± 30 kV	± 30 kV	± 15 kV
ESD Rating per IEC61000-4-2, Air(1)	± 30 kV	± 30 kV	± 30 kV	± 30 kV	± 30 kV	±18 kV
ESD Rating per Human Body Model(2)	± 30 kV	± 30 kV	± 30 kV	± 30 kV	± 30 kV	± 15 kV

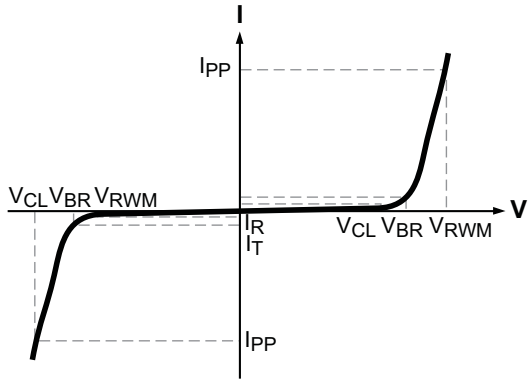
Notes:
1. IEC 61000-4-2 discharge with $C_{Discharge}$ = 150 pF, $R_{Discharge}$ = 330 Ω.
2. Human Body Discharge per MIL-STD-883, Method 3015 $C_{Discharge}$ = 100 pF, $R_{Discharge}$ = 1.5 kΩ.

Maximum Operating Ratings

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

Electrical Characteristics

T_A = 25 °C unless otherwise specified.

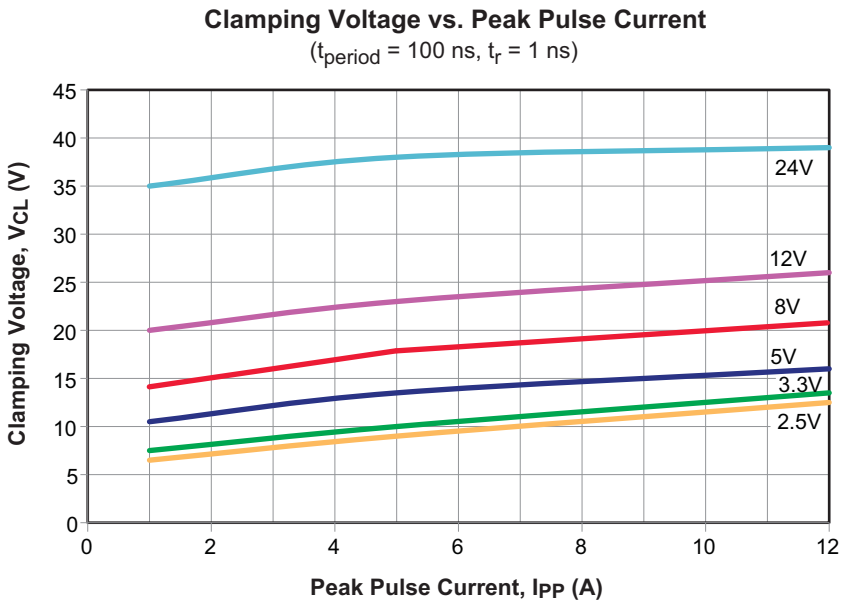
Symbol	Parameter	Diagram
I_{PP}	Reverse Peak Pulse Current, (t_{period} = 100 ns, t_r = 1 ns)	
V_{CL}	Clamping Voltage @ I_{PP}	
V_{RWM}	Working Peak Reverse Voltage	
I_R	Maximum Reverse Leakage Current	
V_{BR}	Breakdown Voltage	
C_J	Capacitance @ V_R = 0 and f = 1 MHz	

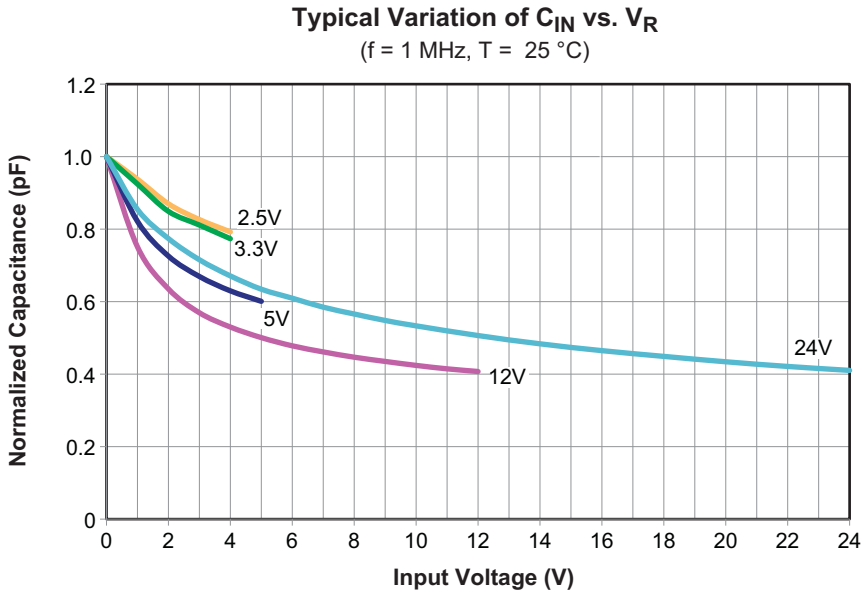
Device	Device Marking	V_{RWM} (V) Max.	V_{BR} (V) Min. @ 1mA	I_R (µA) Max.	V_{CL} Max.(3)			C_J (pF)(3)		
					I_{PP} = 1 A	I_{PP} = 5 A	I_{PP} = 12 A	Min.	Typ.	Max.
AOZ8231ADI-02	P	2.5	3.0	0.1	6.5	9.0	12.5	4.4	5.5	7.0
AOZ8231ADI-03	D	3.3	3.7	0.1	7.5	10.0	13.5	4.4	5.5	7.0
AOZ8231ADI-05	E	5.0	5.5	0.1	10.5	13.5	15.5	10.4	13.0	14.0
AOZ8231ADI-08	Y	8.0	9.5	0.1	15.0	18.0	22.5	19.0	23.0	27.0
AOZ8231ADI-12	F	12.0	13.0	0.1	20.0	23.0	26.0	10.4	13.0	14.0
AOZ8231ADI-24	R	24.0	27.0	0.1	35.0	38.0	39.0	9.6	12.0	15.0

Note:

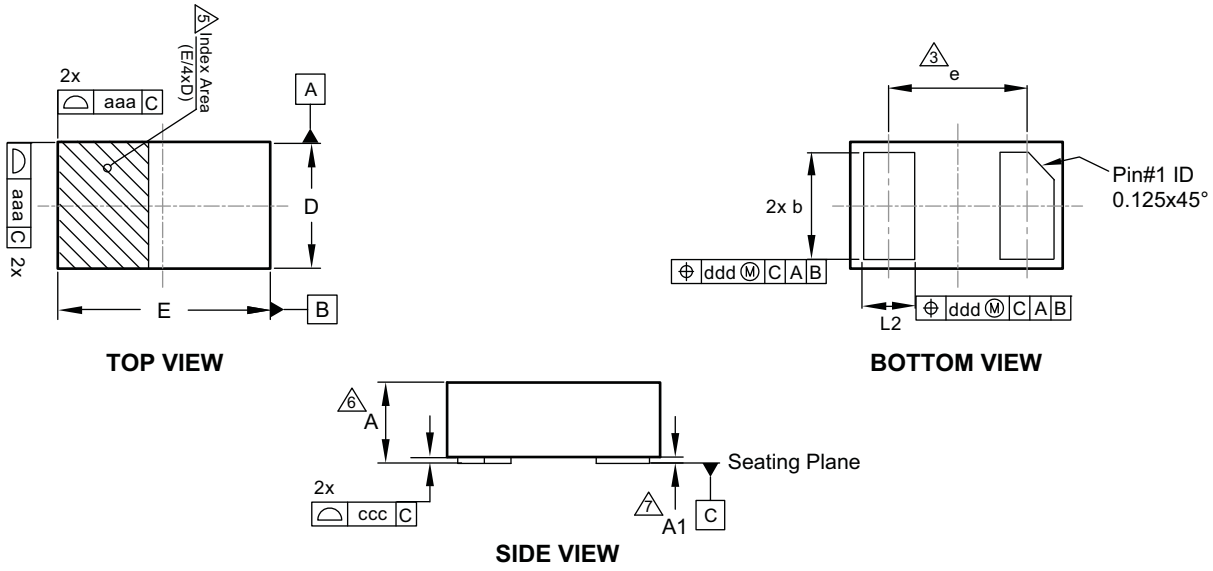
3. Guaranteed by design and characterization.

Typical Performance Characteristics

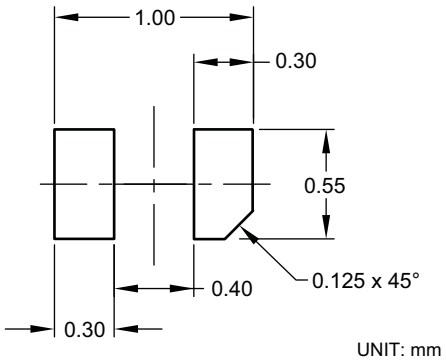




Package Dimensions, DFN 1.0 x 0.6



RECOMMENDED LAND PATTERN



UNIT: mm

Dimensions in millimeters

Symbols	Min.	Nom.	Max.
A	0.47	0.51	0.55
A1	0.00	0.02	0.05
b	0.45	0.50	0.55
D		0.60 BSC	
E		1.00 BSC	
e		0.65 BSC	
L	0.20	0.25	0.30
aaa		0.05	
ccc		0.03	
ddd		0.10	

Dimensions in inches

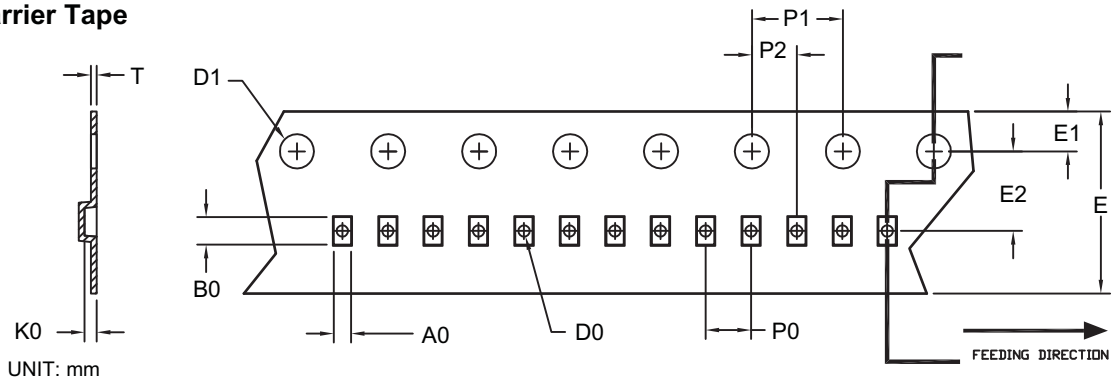
Symbols	Min.	Nom.	Max.
A	0.019	0.020	0.022
A1	0.000	0.001	0.002
b	0.018	0.020	0.022
D		0.024	
E		0.039	
e		0.026	
L	0.008	0.010	0.012
aaa		0.002	
ccc		0.001	
ddd		0.004	

Notes:

1. Dimensions and tolerancing conform to ASME Y14.5-2009.
2. All dimensions are in milliteters.
3. "e" represents the terminal grid pitch.
4. N isthe total number of terminals.
5. A visual index feature must be located within the hatched area. Typical index feature (chamfer) must be located on the edge of the Pin#1 feature.
6. This dimension includes stand-off height "A1" and packaged body thickness, but does not include attached feature e.g. external heatsink or chip capacitors, an internal heatslug is not considered as attached feature.
7. Dimension "A1" is primarily terminal plating, and does not include small metal protrusions.

Tape and Reel Dimensions, DFN 1.0 x 0.6

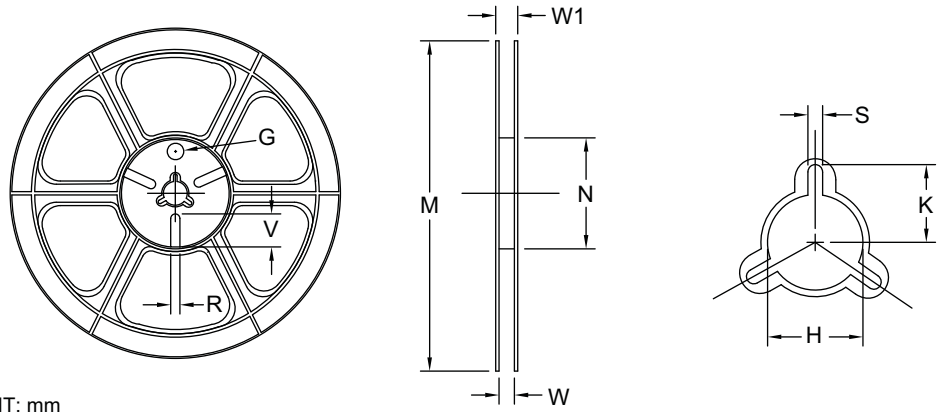
Carrier Tape



UNIT: mm

Option	Package	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
A	DFN 1.0x0.6/ DFN 1.0x0.6A (8 mm)	0.69 ±0.05	1.19 ±0.05	0.66 ±0.05	0.40 ±0.05	1.50 ±0.10	8.00 +0.3/-0.1	1.75 ±0.10	3.50 ±0.05	2.00 ±0.05	4.00 ±0.10	2.00 ±0.05	0.23 ±0.02
B	DFN 1.0x0.6/ DFN 1.0x0.6A (8 mm)	0.65 ±0.04	1.05 ±0.04	0.61 ±0.04	0.40 ±0.05	1.50 ±0.10	8.00 +0.3/-0.1	1.75 ±0.10	3.50 ±0.05	2.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.20 ±0.05

Reel

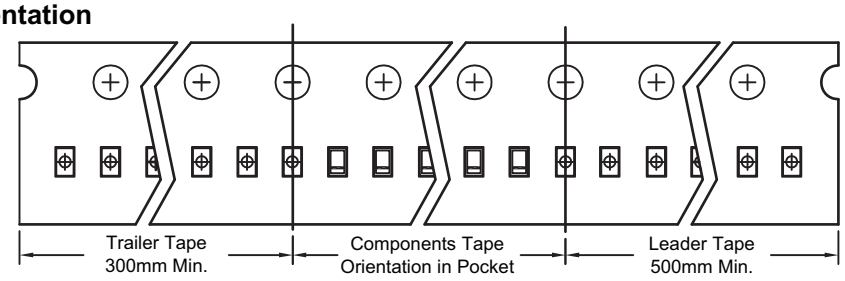


UNIT: mm

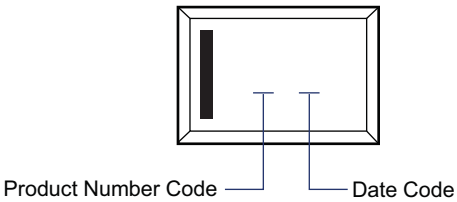
Tape Size	Reel Size	M	N	W	W1	H	K	S	G	R	V
8mm	ø178	ø178 ±0.5	ø55 ±1	8.4 +1.5/-0	Max. 14.4	ø13.0 ±0.5	Max. 10.1	2.0 ±0.5	N/A	N/A	N/A

Leader / Trailer & Orientation

TVS
Unit Per Reel:
10000pcs



Part Marking



AOZ8231ADI_02 = **P**
AOZ8231ADI_03 = **D**
AOZ8231ADI_05 = **E**
AOZ8231ADI_08 = **Y**
AOZ8231ADI_12 = **F**
AOZ8231ADI_24 = **R**