

## 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 ( $\pm 15$  kV air,  $\pm 8$  kV 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

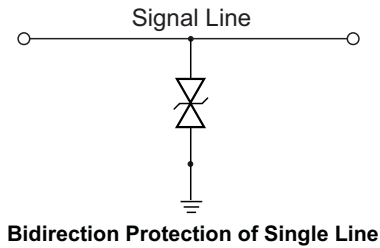
- Portable handheld devices
- Keypads, data lines, buttons
- Notebook computers
- Digital Cameras
- Portable GPS
- MP3 players

## Features

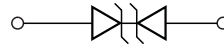
- ESD protection for high-speed data lines
  - AOZ8231ADI-02:
    - Exceeds: IEC 61000-4-2 (ESD)  $\pm 30$  kV (air),  $\pm 30$  kV (contact)
    - Human Body Model (HBM)  $\pm 30$  kV
    - IEC 61000-4-5 (Lightning) 6 A (8/20  $\mu$ S)
    - IEC 61000-4-4 (EFT) 40 A
  - AOZ8231ADI-03:
    - Exceeds: IEC 61000-4-2 (ESD)  $\pm 30$  kV (air),  $\pm 30$  kV (contact)
    - Human Body Model (HBM)  $\pm 30$  kV
    - IEC 61000-4-5 (Lightning) 6 A (8/20  $\mu$ S)
    - IEC 61000-4-4 (EFT) 40 A
  - AOZ8231ADI-05:
    - Exceeds: IEC 61000-4-2 (ESD)  $\pm 30$  kV (air),  $\pm 30$  kV (contact)
    - Human Body Model (HBM)  $\pm 30$  kV
    - IEC 61000-4-5 (Lightning) 5 A (8/20  $\mu$ S)
    - IEC 61000-4-4 (EFT) 40 A
  - AOZ8231ADI-08:
    - Exceeds: IEC 61000-4-2 (ESD)  $\pm 30$  kV (air),  $\pm 30$  kV (contact)
    - Human Body Model (HBM)  $\pm 30$  kV
    - IEC 61000-4-5 (Lightning) 5 A (8/20  $\mu$ S)
    - IEC 61000-4-4 (EFT) 40 A
  - AOZ8231ADI-12:
    - Exceeds: IEC 61000-4-2 (ESD)  $\pm 30$  kV (air),  $\pm 30$  kV (contact)
    - Human Body Model (HBM)  $\pm 30$  kV
    - IEC 61000-4-5 (Lightning) 4 A (8/20  $\mu$ S)
    - IEC 61000-4-4 (EFT) 40 A
  - AOZ8231ADI-24:
    - Exceeds: IEC 61000-4-2 (ESD)  $\pm 18$  kV (air),  $\pm 15$  kV (contact)
    - Human Body Model (HBM)  $\pm 15$  kV
    - IEC 61000-4-5 (Lightning) 2.5 A (8/20  $\mu$ S)
    - 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



## 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](http://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, $t_p = 8/20 \mu s$	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 <sup>(1)</sup>	± 30 kV	± 30 kV	± 30 kV	± 30 kV	± 30 kV	± 15 kV
ESD Rating per IEC61000-4-2, Air <sup>(1)</sup>	± 30 kV	± 30 kV	± 30 kV	± 30 kV	± 30 kV	± 18 kV
ESD Rating per Human Body Model <sup>(2)</sup>	± 30 kV	± 30 kV	± 30 kV	± 30 kV	± 30 kV	± 15 kV

### Notes:

- IEC 61000-4-2 discharge with  $C_{Discharge} = 150 \text{ pF}$ ,  $R_{Discharge} = 330 \Omega$ .
- Human Body Discharge per MIL-STD-883, Method 3015  $C_{Discharge} = 100 \text{ pF}$ ,  $R_{Discharge} = 1.5 \text{ k}\Omega$ .

## Maximum Operating Ratings

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

## Electrical Characteristics

$T_A = 25\text{ }^\circ\text{C}$  unless otherwise specified.

Symbol	Parameter	Diagram
$I_{PP}$	Reverse Peak Pulse Current, ( $t_{\text{period}} = 100\text{ ns}$ , $t_r = 1\text{ ns}$ )	
$V_{CL}$	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 $f = 1\text{ MHz}$	

Device	Device Marking	$V_{RWM}$ (V) Max.	$V_{BR}$ (V) Min. @ 1mA	$I_R$ ( $\mu\text{A}$ ) Max.	$V_{CL}$ Max. <sup>(3)</sup>			$C_J$ (pF) <sup>(3)</sup>		
					$I_{PP} = 1\text{ A}$	$I_{PP} = 5\text{ A}$	$I_{PP} = 12\text{ A}$	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

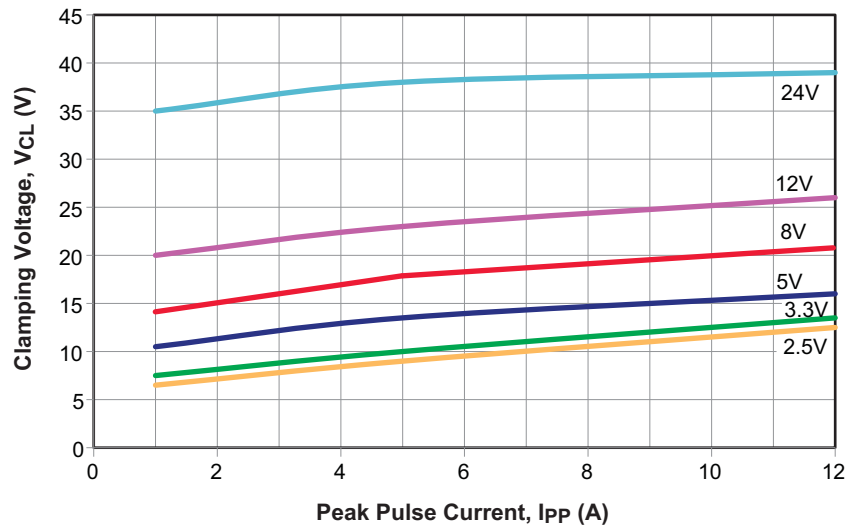
**Note:**

3. Guaranteed by design and characterization.

## Typical Performance Characteristics

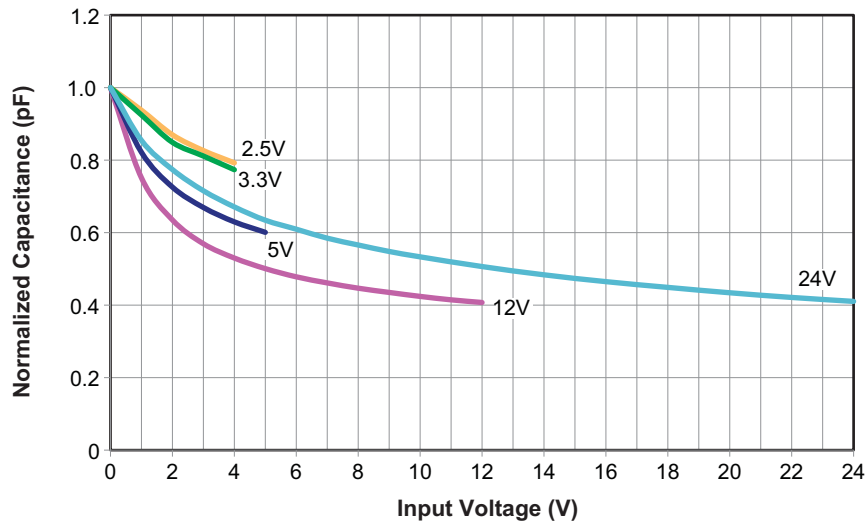
### Clamping Voltage vs. Peak Pulse Current

( $t_{\text{period}} = 100 \text{ ns}$ ,  $t_r = 1 \text{ ns}$ )

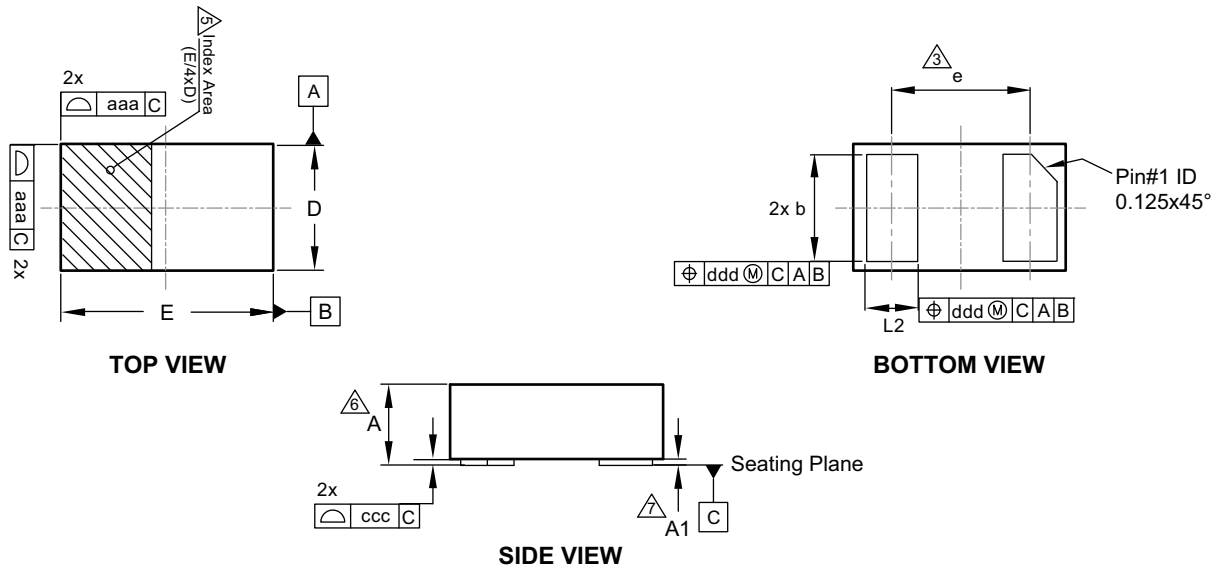


### Typical Variation of $C_{IN}$ vs. $V_R$

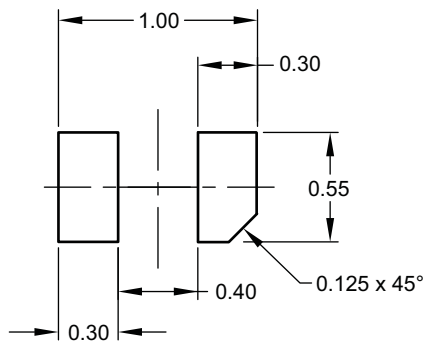
( $f = 1 \text{ MHz}$ ,  $T = 25 \text{ }^\circ\text{C}$ )



Package Dimensions, DFN 1.0 x 0.6



RECOMMENDED LAND PATTERN



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

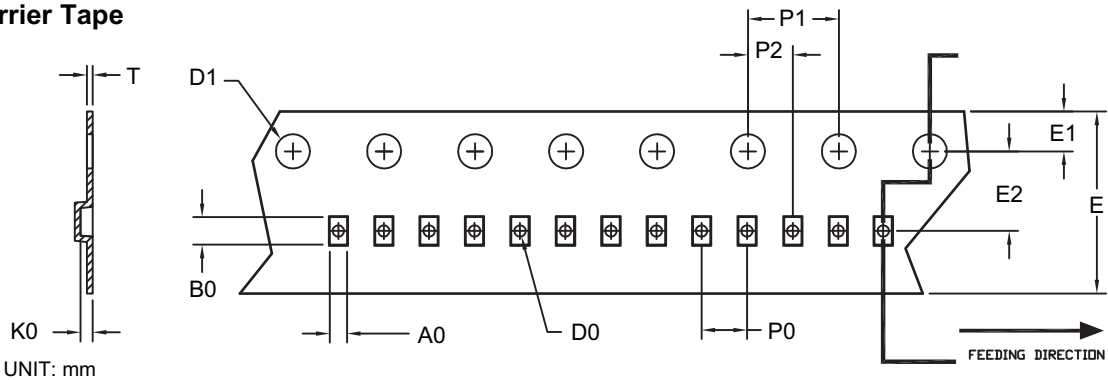
Symbols	Min.	Nom.	Max.
A	0.019	0.020	0.022
A1	0.000	0.001	0.002
b	0.018	0.020	0.022
D	0.024		
E	0.039		
e	0.026		
L	0.008	0.010	0.012
aaa	0.002		
ccc	0.001		
ddd	0.004		

Notes:

1. Dimensions and tolerancing conform to ASME Y14.5-2009.
  2. All dimensions are in millimeters.
  3. "e" represents the terminal grid pitch.
  4. N is the total number of terminals.
- ⚠ 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.
- ⚠ 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.
- ⚠ Dimension "A1" is primarily terminal plating, and does not include small metal protrusions.

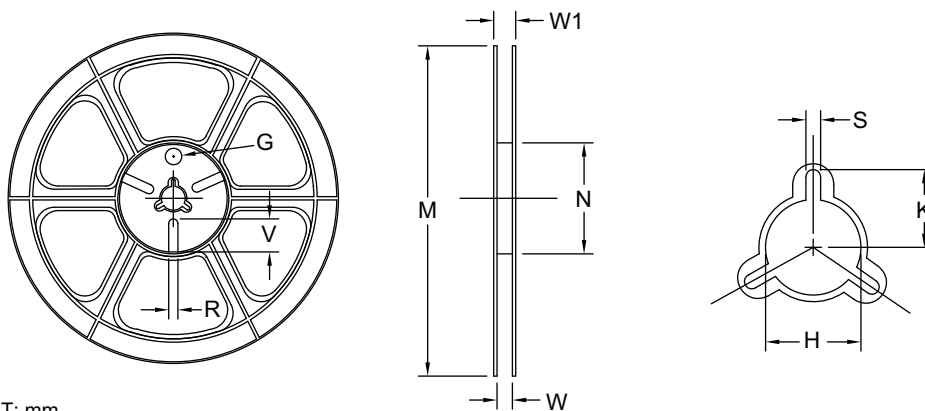
Tape and Reel Dimensions, DFN 1.0 x 0.6

Carrier Tape



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

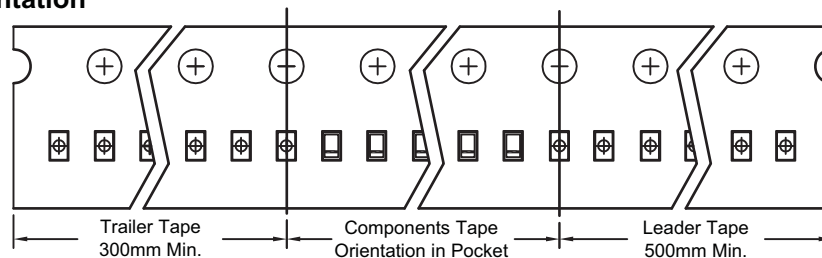
Reel



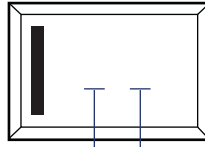
Tape Size	Reel Size	M	N	W	W1	H	K	S	G	R	V
8mm	ø178	ø178 ±0.5	ø55 ±1	8.4 +1.5/-0	Max. 14.4	ø13.0 ±0.5	Max. 10.1	2.0 ±0.5	N/A	N/A	N/A

Leader / Trailer & Orientation

TVS  
Unit Per Reel:  
10000pcs



## Part Marking



Product Number Code      Date Code

AOZ8231ADI\_02 = **P**

AOZ8231ADI\_03 = **D**

AOZ8231ADI\_05 = **E**

AOZ8231ADI\_08 = **Y**

AOZ8231ADI\_12 = **F**

AOZ8231ADI\_24 = **R**

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