

## General Description

The AOZ8211DI is a one-line 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 1.0 mm x 0.6 mm package. During transient conditions, the one-line TVS diode directs the transient to ground. It may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 ( $\pm 15$  kV air,  $\pm 8$  kV contact discharge).

The AOZ8211DI comes in an RoHS compliant 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 the AOZ8211DI ideal for applications where PCB space is at a premium. The small size and high ESD protection makes the AOZ8211DI ideal for protecting voltage sensitive electronics from high transient conditions and ESD.

## Features

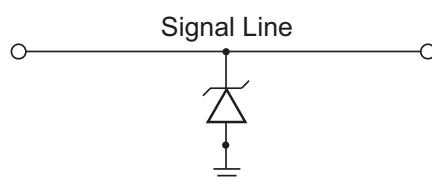
- ESD protection for high-speed data lines:
  - AOZ8211DI-02
    - Exceeds: IEC 61000-4-2 (ESD)  $\pm 30$  kV (air),  $\pm 30$  kV (contact)
    - Human Body Model (HBM)  $\pm 30$  kV
  - AOZ8211DI-03
    - Exceeds: IEC 61000-4-2 (ESD)  $\pm 30$  kV (air),  $\pm 30$  kV (contact)
    - Human Body Model (HBM)  $\pm 30$  kV
  - AOZ8211DI-05
    - Exceeds: IEC 61000-4-2 (ESD)  $\pm 28$  kV (air),  $\pm 28$  kV (contact)
    - Human Body Model (HBM)  $\pm 30$  kV
  - AOZ8211DI-12
    - Exceeds: IEC 61000-4-2 (ESD)  $\pm 28$  kV (air),  $\pm 28$  kV (contact)
    - Human Body Model (HBM)  $\pm 30$  kV
  - AOZ8211DI-24
    - Exceeds: IEC 61000-4-2 (ESD)  $\pm 15$  kV (air),  $\pm 18$  kV (contact)
    - Human Body Model (HBM)  $\pm 30$  kV
- Small package saves board space
- Low insertion loss
- Low clamping voltage
- Low operating voltage: 2.5 V, 3.3 V, 5 V, 12 V and 24 V

## Applications

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

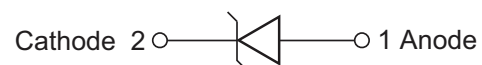


## Typical Application



Unidirection Protection of Single Line

## Pin Configuration



## Ordering Information

| Part Number  | Ambient Temperature Range | Package       | Environmental                   |
|--------------|---------------------------|---------------|---------------------------------|
| AOZ8211DI-02 | -40 °C to +85 °C          | DFN 1.0 x 0.6 | Green Product<br>RoHS Compliant |
| AOZ8211DI-03 |                           |               |                                 |
| AOZ8211DI-05 |                           |               |                                 |
| AOZ8211DI-12 |                           |               |                                 |
| AOZ8211DI-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   | AOZ8211DI-02      | AOZ8211DI-03      | AOZ8211DI-05      | AOZ8211DI-12      | AOZ8211DI-24      |
|---|-------------------|-------------------|-------------------|-------------------|-------------------|
| Peak Pulse Current, $t_p = 8/20 \mu s$              | 6 A               | 6 A               | 5.5 A             | 5 A               | 2.5 A             |
| Peak Pulse Power, $t_p = 8/20 \mu s$                | 50 W              | 55 W              | 50 W              | 100 W             | 110 W             |
| Storage Temperature ( $T_S$ )                       | -65 °C to +150 °C | -65 °C to +150 °C | -65 °C to +150 °C | -65 °C to +150 °C | -65 °C to +150 °C |
| ESD Rating per IEC61000-4-2, Contact <sup>(1)</sup> | ±30 kV            | ±30 kV            | ±28 kV            | ±28 kV            | ±18 kV            |
| ESD Rating per IEC61000-4-2, Air <sup>(1)</sup>     | ±30 kV            | ±30 kV            | ±28 kV            | ±28 kV            | ±15 kV            |
| ESD Rating per Human Body Model <sup>(2)</sup>      | ±30 kV            | ±30 kV            | ±30 kV            | ±30 kV            | ±30 kV            |

Notes:

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

## Maximum Operating Ratings

| Parameter                      | Rating           |
|--------------------------------|------------------|
| Junction Temperature ( $T_J$ ) | -40 °C to +85 °C |

### Electrical Characteristics

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

| Symbol    | Parameter                                      | Diagram |
|-----------|--|---------|
| $I_{PP}$  | Maximum Reverse Peak Pulse Current             |         |
| $V_{CL}$  | Clamping Voltage @ $I_{PP}$                    |         |
| $V_{RWM}$ | Working Peak Reverse Voltage                   |         |
| $I_R$     | Maximum Reverse Leakage Current                |         |
| $V_{BR}$  | Breakdown Voltage @ $I_T$                      |         |
| $I_F$     | Forward Current                                |         |
| $V_F$     | Forward Voltage                                |         |
| $P_{PK}$  | Peak Power Dissipation                         |         |
| $C_J$     | Capacitance @ $V_R = 0$ and $f = 1\text{ MHz}$ |         |

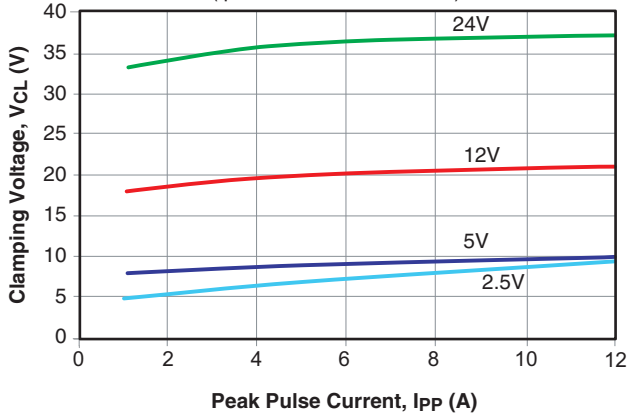
### Electrical Characteristics

$T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted,  $V_F = 0.9\text{ V Max.}$  @  $I_F = 10\text{ mA}$  for all types.

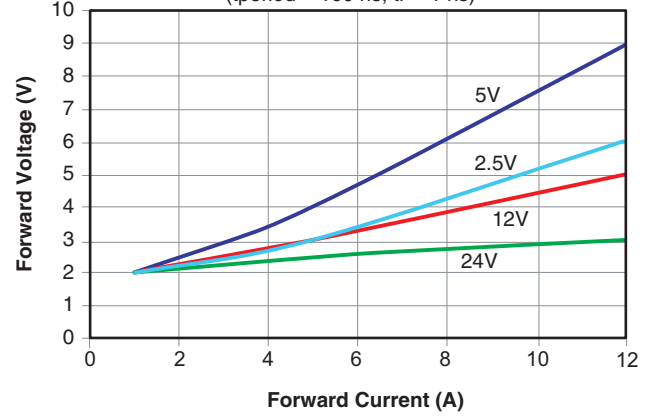
| Device       | Device Marking | $V_{RWM}$ (V)<br>Max. | $I_R$ ( $\mu\text{A}$ )<br>Max. | $V_{BR}$ (V)<br>Min. | $I_T$                  | $V_F$ (V)<br>Typ. | $V_{CL}$ Max.         |                       |                        | $C_J$ (pF)<br>Typ. |
|--------------|----------------|-----------------------|---------------------------------|----------------------|------------------------|-------------------|-----------------------|-----------------------|------------------------|--------------------|
|              |                |                       |                                 |                      |                        |                   | $I_{PP} = 1\text{ A}$ | $I_{PP} = 5\text{ A}$ | $I_{PP} = 12\text{ A}$ |                    |
| AOZ8211DI-02 | Q              | 2.5                   | 0.1                             | 2.8                  | $2\text{ }\mu\text{A}$ | 0.75              | 5.00                  | 7.00                  | 9.50                   | 11                 |
| AOZ8211DI-03 | G              | 3.3                   | 0.1                             | 3.7                  | $2\text{ }\mu\text{A}$ | 0.75              | 5.50                  | 7.50                  | 9.50                   | 11                 |
| AOZ8211DI-05 | J              | 5.0                   | 0.1                             | 6.0                  | 1 mA                   | 0.75              | 8.00                  | 9.00                  | 10.00                  | 16                 |
| AOZ8211DI-12 | K              | 12.0                  | 0.1                             | 14.0                 | 1 mA                   | 0.75              | 18.00                 | 20.00                 | 21.00                  | 30                 |
| AOZ8211DI-24 | M              | 24.0                  | 0.1                             | 27.0                 | 1 mA                   | 0.75              | 33.00                 | 36.00                 | 37.00                  | 20                 |

## Typical Performance Characteristics

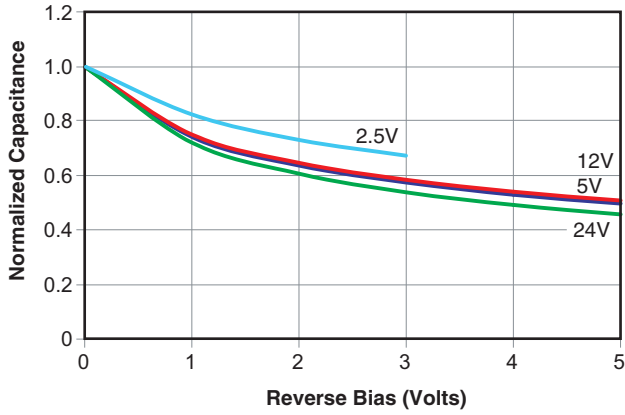
**Clamping Voltage vs. Peak Pulse Current**  
(tperiod = 100 ns, tr = 1 ns)



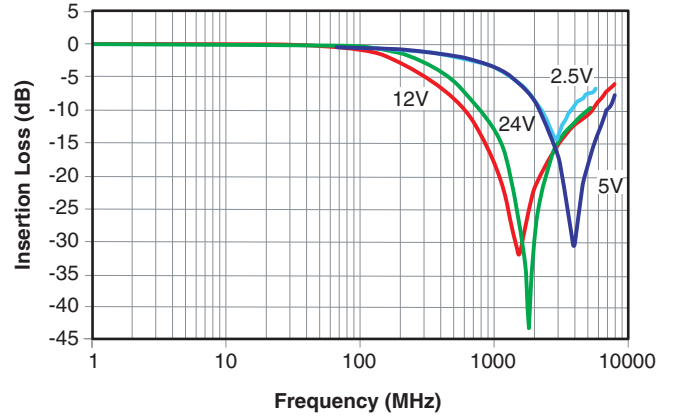
**Forward Voltage vs. Forward Current**  
(tperiod = 100 ns, tr = 1 ns)



**Capacitance vs. Reverse Bias**



**I/O – Gnd Insertion Loss vs. Frequency**



## LEGAL DISCLAIMER

Applications or uses as critical components in life support devices or systems are not authorized. AOS does not assume any liability arising out of such applications or uses of its products. AOS reserves the right to make changes to product specifications without notice. It is the responsibility of the customer to evaluate suitability of the product for their intended application. Customer shall comply with applicable legal requirements, including all applicable export control rules, regulations and limitations.

AOS' products are provided subject to AOS' terms and conditions of sale which are set forth at:

[http://www.aosmd.com/terms\\_and\\_conditions\\_of\\_sale](http://www.aosmd.com/terms_and_conditions_of_sale)

## LIFE SUPPORT POLICY

ALPHA AND OMEGA SEMICONDUCTOR PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.