AOZ8S212UD4
4-Channel Ultra-Low Capacitance TVS Diode Array

General Description
The AOZ8S212UD4 is a transient voltage suppressor array designed to protect high speed data lines such as HDMI 2.0/2.1, USB 3.2, LVDS, and V-by-one from damaging ESD events.

This device incorporates a number of 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 AOZ8S212UD4 provides a typical line-to-line capacitance of 0.20 pF and low insertion loss providing greater signal integrity making it ideally suited for HDMI 2.0/2.1 or USB 3.2 applications, such as Digital TVs, DVD players, computing, set-top boxes and MDDI applications in mobile computing devices.

The AOZ8S212UD4 comes in a RoHS compliant and Halogen Free 2.5 mm x 1.0 mm x 0.55 mm DFN-10L package and is rated for -40°C to +125°C junction temperature range.

Features
- IEC 61000-4-2 (ESD):
  - Air discharge: ±10 kV
  - Contact discharge: ±8 kV
- IEC 61000-4-5 (Lightning, 8/20 μs) 3 A
- Human Body Model (HBM) ±8 kV
- Protects four I/O lines
- Low capacitance between I/O to GND: 0.2 pF
- Low clamping voltage
- Low operating voltage: 3.3 V, 5 V

Applications
- HDMI 2.0/2.1, USB 3.2, Thunderbolt, V-by-One
- Monitors and flat panel displays
- Set-top box
- Video graphics cards
- Notebook computers

Typical Applications
### Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Ambient Temperature Range</th>
<th>Package</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOZ8S212UD4-03</td>
<td>-40°C to +125°C</td>
<td>2.5 mm x 1.0 mm DFN-10L</td>
<td>Green Product</td>
</tr>
<tr>
<td>AOZ8S212UD4-05</td>
<td>-40°C to +125°C</td>
<td>2.5 mm x 1.0 mm DFN-10L</td>
<td>Green Product</td>
</tr>
</tbody>
</table>

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.

### Pin Configuration

![Pin Configuration Diagram](image)

### Absolute Maximum Ratings

Exceeding the Absolute Maximum ratings may damage the device.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature ($T_S$)</td>
<td>-65 °C to +150 °C</td>
</tr>
<tr>
<td>ESD Rating per IEC 61000-4-2, contact(1)</td>
<td>±8 kV</td>
</tr>
<tr>
<td>ESD Rating per IEC 61000-4-2, air(1)</td>
<td>±10 kV</td>
</tr>
<tr>
<td>ESD Rating per Human Body Model(2)</td>
<td>±8 kV</td>
</tr>
</tbody>
</table>

**Notes:**

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

### Maximum Operating Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junction Temperature ($T_J$)</td>
<td>-40 °C to +125 °C</td>
</tr>
</tbody>
</table>
Electrical Characteristics

\( T_A = 25^\circ C \) unless otherwise specified. Any I/O Pin-to-Ground.

### Table: Electrical Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{RWM} )</td>
<td>Reverse Working Voltage</td>
<td>AOZ8S212UD4-03</td>
<td>3.3</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AOZ8S212UD4-05</td>
<td>5</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_{BR} )</td>
<td>Reverse Breakdown Voltage</td>
<td>( I_T = 100 , \mu A )</td>
<td>6</td>
<td>V</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>( I_R )</td>
<td>Reverse Leakage Current</td>
<td>Max. ( V_{RWM} )</td>
<td>1</td>
<td>nA</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>( V_{CL} )</td>
<td>Clamping Voltage (^{(3)(4)}) ( (100 , ns , Transmission , Line , Pulse, , I/O , Pin , to , GND) )</td>
<td>( I_{TLP} = 1 , A )</td>
<td>1.5</td>
<td>V</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>( I_{TLP} = -1 , A )</td>
<td>-1.5</td>
<td>V</td>
<td>-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>( I_{TLP} = 15 , A )</td>
<td>8</td>
<td>V</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>( I_{TLP} = -15 , A )</td>
<td>-9</td>
<td>V</td>
<td>-11</td>
<td></td>
</tr>
<tr>
<td>( R_{DNY} )</td>
<td>Dynamic Resistance (^{(3)})</td>
<td>( I_{TLP} = 1,A ) to 15 , A</td>
<td>0.45</td>
<td>( \Omega )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( C_J )</td>
<td>Junction Capacitance</td>
<td>( V_{PIN , 3.8} = 0 , V, , V_{IO} = 1.65 , V, , f = 1 , MHz )</td>
<td>0.20</td>
<td>pF</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>( V_{PIN , 3.8} = 0 , V, , V_{IO} = 1.65 , V, , f = 1 , MHz, ) ( I/O ) Pin-to-I/O Pin</td>
<td>0.10</td>
<td>pF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes:

3. These specifications are guaranteed by design and characterization.
4. Measurements performed using a 100ns Transmission Line Pulse (TLP) system.
Typical Characteristics

Positive Transmission Line Pulse
(TP=100ns, TR= 0.2ns)

Negative Transmission Line Pulse
(TP=100ns, TR= 0.2ns)

Typical Variations of CJ vs. Input Voltage

IEC61000-4-5 Surge 8/20us

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

-8kV ESD Clamping Per IEC 61000-4-2
(Contact, Any I/O to GND Pin)
Typical Characteristics (Continued)

HDMI 2.1 Eye-Diagram (16 Gbps)

USB 3.1 Gen2 Eye-Diagram (10 Gbps)

Insertion Loss (S21, I/O to GND)

Insertion Loss (dB)

Frequency (GHz)
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