



# ***AOS Semiconductor Product Reliability Report***

**AOZ8211DI-03, rev A**

**Plastic Encapsulated Device**

**ALPHA & OMEGA Semiconductor, Inc**

**[www.aosmd.com](http://www.aosmd.com)**

**This AOS product reliability report summarizes the qualification result for AOZ8211DI-03.**

**Review of the electrical test results confirm that AOZ8211DI-03 pass AOS quality and reliability requirements for product release. The continuous qualification testing and reliability monitoring program ensure that all outgoing products will continue to meet AOS quality and reliability standards.**

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### I. Product Description:

The AOZ8211DI-03 is a one-line transient voltage suppressor diode designed to protect voltage sensitive electronics from high transient conditions and ESD.

- ROHS compliant
- Halogen free

<b>Absolute Maximum Ratings</b>	
<b>Parameter</b>	
VP-VN	3.3v
Peak Pulse Current (Ipp), tp=8/20uS	6A
Storage Temperature (Ts)	-65°C to +150°C
ESD Rating per IEC61000-4-2, contact <sup>(1)</sup>	±30kV
ESD Rating per IEC61000-4-2, air <sup>(2)</sup>	±30kV
ESD Rating per Human Body Model <sup>(2)</sup>	±30kV
Junction Temperature (Tj)	-40°C to + 85°C

Notes:

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

### II. Package and Die Information:

<b>Product ID</b>	AOZ8211DI-03
<b>Process</b>	HV044A1
<b>Package Type</b>	DFN 1.0*0.6
<b>Lead Frame</b>	Cu, NiPbAu
<b>Die attach material</b>	QMI519
<b>Die bond wire</b>	Au, 0.8 mil
<b>MSL level</b>	Up to Level 1

### III. Qualification Tests Requirements

- 33 lots of AOZ8211DI-03 & AOZ82XXNI/KI/DI/ADI series (same generic family) up to 168/500 hrs of HTOL for New Product release.
- 6 lots of package qual testing (PCT, 500 cycles TC, HAST) for package release to manufacturing.

### IV. Qualification Tests Result

Test Item	Test Condition	Sample Size	Result	Comment
Pre-Conditioning	Per JESD 22-A113 168hrs @85 °C /85%RH+3 cyc reflow @260°C	6 lots (Sum of TC,PCT and HAST)	pass	
HTOL	Per JESD 22-A108_B Vdd= 4v Temp = 150°C	33 lots (77 /lot)	pass	
Temperature Cycle	'-65 °C to +150 °C, air to air (2cyc/hr)	5 lots (77 /lot)	pass	
Pressure Pot	121°C, 29.7psi, RH= 100%	6 lots (77 /lot)	pass	
HAST	'130 +/- 2°C, 85%RH, 33.3 psi, at VCC min power dissipation.	6 lot (55 /lot)	pass	
ESD Rating	Per IEC-61000-4-2, contact	3 lots (5 /lot)	pass	±28kV contact
ESD Rating	Per IEC-61000-4-2, air discharge	3 lots (5 /lot)	pass	±28kV contact

**The qualification test results confirm that AOZ8211DI-03 pass AOS quality and reliability requirements for product release.**

## V. Reliability Evaluation

**FIT rate (per billion): 4.24**

**MTTF = 26906 years**

The presentation of FIT rate for the individual product reliability is restricted by the actual HTOL sample size of the selected product itself and its generic family. Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion device hours.

**Failure Rate** =  $\text{Chi}^2 \times 10^9 / [2 (N) (H) (Af)] = 1.83 \times 10^9 / [2 \times (17 \times 77 \times 168 + 16 \times 77 \times 500) \times 258] = 4.24$

**MTTF** =  $10^9 / \text{FIT} = 2.36 \times 10^8 \text{hrs} = 26906 \text{ years}$

**Chi<sup>2</sup>** = Chi Squared Distribution, determined by the number of failures and confidence interval

**N** = Total Number of units from HTOL tests

**H** = Duration of HTOL testing

**Af** = Acceleration Factor from Test to Use Conditions (Ea = 0.7eV and Tuse = 55°C)

Acceleration Factor [**Af**] =  $\text{Exp}_{[Ea / k (1/Tj u - 1/Tj s)]}$

**Acceleration Factor ratio list:**

	55 deg C	70 deg C	85 deg C	100 deg C	115 deg C	130 deg C	150 deg C
<b>Af</b>	<b>258</b>	<b>87</b>	<b>32</b>	<b>13</b>	<b>5.64</b>	<b>2.59</b>	<b>1</b>

**Tj s** = Stressed junction temperature in degree (Kelvin), K = C+273.16

**Tj u** = The use junction temperature in degree (Kelvin), K = C+273.16

**k** = Boltzmann's constant,  $8.617164 \times 10^{-5} \text{eV} / \text{K}$