

# ***Alpha & Omega Semiconductor Product Reliability Qualification Report***

**AOZ2260HQI-10** rev A

**Plastic Encapsulated Device**

**ALPHA & OMEGA Semiconductor, Inc**

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

This AOS product reliability report summarizes the qualification results for AOZ2260HQI-10 in QFN4x4-22L package. Accelerated environmental tests are performed on a specific sample size and samples are electrically tested before and after each time point. Review of final electrical test results confirm that AOZ2260HQI-10 pass the AOS quality and reliability requirements. The released products will be categorized by its process family and routinely monitored for continuous improvement of product quality.

## I. Reliability Stress Test Summary and Results

| Test Item         | Test Condition                                                                             | Time Point                 | Total Sample Size | Number of Failures | Reference Standard       |
|-------------------|--------------------------------------------------------------------------------------------|----------------------------|-------------------|--------------------|--------------------------|
| HTOL              | T <sub>J</sub> = 125°C,<br>V <sub>IN</sub> = V <sub>ccmax</sub>                            | 168 / 500 /<br>1000 hours  | 231 pcs           | 0                  | JESD22-A108              |
| Preconditioning   | T <sub>A</sub> = 30°C, RH = 60% +<br>3 cycle reflow @ 260°C<br>(MSL 3)                     | 192 hours                  | 231*4 pcs         | 0                  | JESD22-A113<br>J-STD-020 |
| HAST              | T <sub>A</sub> = 130°C, RH = 85%,<br>P = 33.3psia,<br>V <sub>IN</sub> = V <sub>ccmax</sub> | 96 hours                   | 231 pcs           | 0                  | JESD22-A110              |
| Autoclave         | T <sub>A</sub> = 121°C, RH = 100%,<br>P = 29.7psia                                         | 96 hours                   | 231 pcs           | 0                  | JESD22-A102              |
| Temperature Cycle | T <sub>A</sub> = -65°C to 150°C,<br>air to air                                             | 250 / 500 /<br>1000 cycles | 231 pcs           | 0                  | JESD22-A104              |
| HTSL              | Temp = 150°C                                                                               | 500 / 1000 /<br>hours      | 231 pcs           | 0                  | JESD22-A103              |

## II. Reliability Evaluation

**FIT rate (per billion): 50.97**

**MTTF = 2240 years**

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size. Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion hours.

**Failure Rate** =  $\text{Chi}^2 \times 10^9 / [2 (N) (H) (Af)] = 50.97$

**MTTF** =  $10^9 / \text{FIT} = 2240$  years

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

**N** = Total Number of units from burn-in tests

**H** = Duration of burn-in testing

**Af** = Acceleration Factor from Test to Use Conditions (E<sub>a</sub> = 0.7eV and T<sub>use</sub> = 55°C)

Acceleration Factor [**Af**] =  $\text{Exp} [E_a / k (1/T_{J u} - 1/T_{J s})]$

**Acceleration Factor ratio list:**

|           | 55 deg C  | 70 deg C  | 85 deg C   | 100 deg C  | 115 deg C  | 125 deg C |
|-----------|-----------|-----------|------------|------------|------------|-----------|
| <b>Af</b> | <b>77</b> | <b>26</b> | <b>9.8</b> | <b>3.9</b> | <b>1.7</b> | <b>1</b>  |

**T<sub>J s</sub>** = Stressed junction temperature in degree (Kelvin), K = C + 273.16

**T<sub>J u</sub>** = The use junction temperature in degree (Kelvin), K = C + 273.16

**k** = Boltzmann's constant, 8.617164 X 10<sup>-5</sup>eV / K

### III. ESD and Latch Up Test Results

| Test                                         | Test Conditions                          | Total Sample Size | Number of Failures | Reference Standard |
|----------------------------------------------|------------------------------------------|-------------------|--------------------|--------------------|
| Electrostatic Discharge Human Body Model     | T <sub>A</sub> = 25°C, +/-2kV            | 3                 | 0                  | JS-001-2017        |
| Electrostatic Discharge Charged Device Model | T <sub>A</sub> = 25°C, +/-1kV            | 3                 | 0                  | JS-002-2018        |
| Latch Up                                     | T <sub>A</sub> = 25°C, +/-100mA, 1.5xOV  | 6                 | 0                  | JESD78             |
| Latch Up                                     | T <sub>A</sub> = 125°C, +/-100mA, 1.5xOV | 6                 | 0                  | JESD78             |

(1) ATE results are used to determine PASS/FAIL. Parametric shift <10%.

