

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

**AOZ21502QI-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 AOZ21502QI-10 in QFN3x3-21L 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 AOZ21502QI-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, V <sub>IN</sub> = V <sub>ccmax</sub>	168 / 500 / 1000 hours	231 pcs	0	JESD22-A108
Preconditioning	T <sub>A</sub> = 30°C, RH = 60% + 3 cycle reflow @ 260°C (MSL 3)	192 hours	231*4 pcs	0	JESD22-A113 J-STD-020
HAST	T <sub>A</sub> = 130°C, RH = 85%, P = 33.3psia, V <sub>IN</sub> = V <sub>ccmax</sub>	96 hours	231 pcs	0	JESD22-A110
Autoclave	T <sub>A</sub> = 121°C, RH = 100%, P = 29.7psia	96 hours	231 pcs	0	JESD22-A102
Temperature Cycle	T <sub>A</sub> = -65°C to 150°C, air to air	250 / 500 / 1000 cycles	231 pcs	0	JESD22-A104
HTSL	Temp = 150°C	500 / 1000 / 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
Af	77	26	9.8	3.9	1.7	1

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-002-2022
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%.

