



ALPHA & OMEGA
SEMICONDUCTOR

Alpha & Omega Semiconductor Product Reliability Report

AOZ23655RQI, rev A

Plastic Encapsulated Device

ALPHA & OMEGA Semiconductor, Inc

www.aosmd.com

This AOS product reliability report summarizes the qualification results for AOZ23655RQI in QFN5x5A_31L 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 AOZ23655RQI 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 _J = 125°C, V _{IN} = V _{ccmax} | 168 / 500 / 1000 hours | 231 pcs | 0 | JESD22-A108 |
| Preconditioning (Note A) | T _A = 30°C, RH = 60% + 3 cycle reflow @ 260°C (MSL 3) | 192 hours | 1155 pcs | 0 | JESD22-A113 |
| HAST | T _A = 130°C, RH = 85%, P = 33.3psia, V _{IN} = V _{ccmax} | 96 hours | 231 pcs | 0 | JESD22-A110 |
| THB | T _A = 85°C, RH = 85%, V _{IN} = V _{ccmax} | 168 / 500 / 1000 hours | 231 pcs | 0 | JESD22-A101 |
| Autoclave | T _A = 121°C, RH = 100%, P = 29.7psia | 96 hours | 231 pcs | 0 | JESD22-A102 |
| Temperature Cycle | T _A = -65°C to 150°C, air to air | 250 / 500 / 1000 cycles | 231 pcs | 0 | JESD22-A104 |
| HTSL | Temp = 150°C | 168 / 500 / 1000 hours | 231 pcs | 0 | JESD22-A103 |

Note: The reliability data presents total of available generic data up to the published date.

Note A: MSL (Moisture Sensitivity Level) 3 based on J-STD-020

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

Chi² = 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_a = 0.7eV and T_{use} = 55°C)

Acceleration Factor **[Af]** = **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 |

$T_{J s}$ = Stressed junction temperature in degree (Kelvin), $K = C + 273.16$

$T_{J u}$ = The use junction temperature in degree (Kelvin), $K = C + 273.16$

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

III. ESD and Latch Up Test Results

| Test | Test Conditions | Total Sample Size | Number of Failures | Reference Standard |
|--|--|-------------------|--------------------|--------------------|
| Electrostatic Discharge Human Body Model | $T_A = 25^\circ\text{C}$, +/-2.5kV | 3 | 0 | JESD-A114 |
| Electrostatic Discharge Charged Device Model | $T_A = 25^\circ\text{C}$, +/-1kV | 3 | 0 | JESD-C101 |
| Latch Up | $T_A = 25^\circ\text{C}$, +/-100mA/1.5x OV | 6 | 0 | JESD78 |
| Latch Up | $T_A = 85^\circ\text{C}$, +/-100mA/1.5x OV | 6 | 0 | JESD78 |

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

