



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

**AOZ13984DI-02**, rev B

**Plastic Encapsulated Device**

**ALPHA & OMEGA Semiconductor, Inc**

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

This AOS product reliability report summarizes the qualification result for AOZ13984DI-02. Accelerated environmental tests are performed on a specific sample size, and then followed by electrical test at end point. Review of final electrical test result confirms that AOZ13984DI-02 using TP004E8 version meet requirements as extension qualification. The released product will be categorized by the process family and be routine monitored for continuously improving the product quality.

## I. Reliability Stress Test Summary and Results

Test Item	Test Condition	Time Point	Total Sample Size	Number of Failures	Reference Standard
HTOL (TP004E6 and TP004E8)	Temp = 125°C, Vcc=Vccmax	168 / 500 / 1000 hours and 168hours	240 pcs  80 pcs	0	JESD22-A108
Precondition (Note A)	192hr 30°C / 60%RH + 3 cycle reflow @260°C (MSL 3)	-	960 pcs	0	JESD22-A113
HAST (Note 1)	130°C, RH = 85%, 33.3 psia, Vcc= Vccmax	96 hours	240 pcs	0	JESD22-A110
Autoclave	121°C , 29.7psia, RH=100%	96 hours	240pcs	0	JESD22-A102
Temperature Cycle	-65°C to 150°C, air to air	250 / 500 cycles	240 pcs	0	JESD22-A104
High Temperature storage (Note1)	150°C	168 hours	240pcs	0	JESD22-A103

**Note A:**

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

## II. Reliability Evaluation

**FIT rate (per billion): 13.91**

**MTTF = 8206 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** =  $\text{Chi}^2 \times 10^9 / [2 (N) (H) (Af)] = 15.26$

**MTTF** =  $10^9 / \text{FIT} = 8206$  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 ( $E_a = 0.7\text{eV}$  and  $T_{use} = 55^\circ\text{C}$ )

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

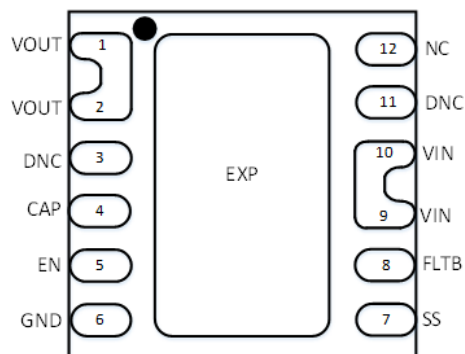
**T<sub>j</sub> u** = The use junction temperature in degree (Kelvin),  $K = C + 273.16$

**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	$T_A = 25^\circ\text{C}$ , +/-4kV	3	0	JESD-A114
Electrostatic Discharge Charged Device Model	$T_A = 25^\circ\text{C}$ , +/-1kV	3	0	JESD-C101
Electrostatic Discharge Immunity (only VIN pin)	$T_A = 25^\circ\text{C}$ , +/-8kV	3	0	IEC61000-4-2
Electrostatic Discharge Surge test (only VIN pin)	$T_A = 25^\circ\text{C}$ , 40V	3	0	IEC61000-4-5
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%.



3mm x 3mm DFN-12L  
(Top Transparent View)