



**ALPHA & OMEGA**  
SEMICONDUCTOR

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

## **AOZ1380DI/AOZ1380DI-01**

**Rev A**

**Plastic Encapsulated Device**

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This AOS product reliability report summarizes the qualification results for AOZ1380DI and AOZ1380DI-01 in DFN3x5.2-20L 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 AOZ1380DI and AOZ1380DI-01 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.

### Qualification Tests Requirements

- AOZ1380DI and AOZ1380DI-01 a platform product
- AOZ1380DI/AOZ1380DI-01 3 lots 1000hrs HTOL
- 3 lots preconditioning, 96hrs PCT, 96hrs HAST, 1000 cycles TC, 1000hrs HTS
- 1 lot HBM, CDM ESD, Latch-up

### 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 (Note A)	T <sub>A</sub> = 85°C, RH = 85% + 3 cycle reflow @ 260°C (MSL 1)	168hours	693 pcs	0	JESD22-A113
HAST	T <sub>A</sub> = 130°C, RH = 85%, P = 33.3psia	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
High Temperature Storage	T <sub>A</sub> = 150°C	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) 1 based on J-STD-020

### II. Reliability Evaluation

**FIT rate (per billion): 15.26**

**MTTF = 8778 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** =  $10^9 / \text{FIT} = 7480 \text{ years}$

**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

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

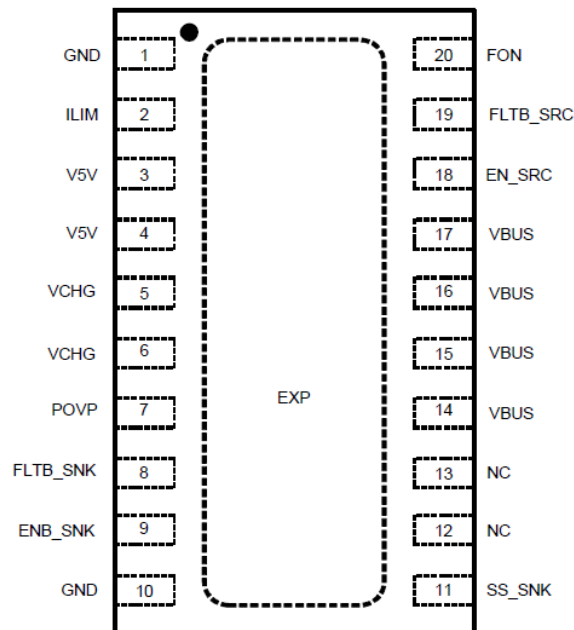
$T_{j u}$  = The use junction temperature in degree (Kelvin),  $K = C + 273.16$

$k$  = 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
Electrostatic Discharge Immunity (only VOUT pin)	$T_A = 25^\circ\text{C}$ , +/-8kV	3	0	IEC61000-4-2

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



DFN 3mm x 5.2mm-20L  
 (Top Transparent View)