



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

**AO4435/L, rev C**

**Plastic Encapsulated Device**

**ALPHA & OMEGA Semiconductor, Inc**

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

This AOS product reliability report summarizes the qualification result for AO4435/L. 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 AO4435/L passes AOS quality and reliability requirements. The released product will be categorized by the process family and be monitored on a quarterly basis for continuously improving the product quality.

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### I. Product Description:

The AO4435/L uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , and ultra-low low gate charge with a 25V gate rating. This device is suitable for use as a load switch or in PWM applications. AO4435 and AO4435L are electrically identical.

- RoHS Compliant
- AO4435L is Halogen Free

Detailed information refers to datasheet.

### II. Die / Package Information:

	<b>AO4435/L</b>
<b>Process</b>	Standard sub-micron Low voltage P channel
<b>Package Type</b>	8 lead SOIC
<b>Lead Frame</b>	Copper
<b>Die Attach</b>	Ag Epoxy
<b>Bonding Wire</b>	Cu wire
<b>Mold Material</b>	Epoxy resin with silica filler
<b>MSL (moisture sensitive level)</b>	Level 1 based on J-STD-020

**Note** \* based on information provided by assembler and mold compound supplier

### III. Result of Reliability Stress for AO4435/L

Test Item	Test Condition	Time Point	Lot Attribution	Total Sample size	Number of Failures	Standard
MSL Precondition	168hr 85°C /85%RH +3 cycle reflow@260°C	-	29 lots	3575pcs	0	JESD22-A113
HTGB	Temp = 150 °c, Vgs=100% of Vgsmax	168hrs 500 hrs 1000 hrs	1 lot 3 lots (Note A*)	308pcs 77pcs / lot	0	JESD22-A108
HTRB	Temp = 150 °c, Vds=80% of Vdsmax	168hrs 500 hrs 1000 hrs	1 lot 3 lots (Note A*)	308pcs 77pcs / lot	0	JESD22-A108
HAST	130 +/- 2°C, 85%RH, 33.3 psi, Vgs = 80% of Vgs max	100 hrs	16 lots (Note A*)	880pcs 55 pcs / lot	0	JESD22-A110
Pressure Pot	121°C, 29.7psi, RH=100%	96 hrs	20 lots (Note A*)	1100pcs 55 pcs / lot	0	JESD22-A102
Temperature Cycle	-65°C to 150°C, air to air	250 / 500 cycles	29 lots (Note A*)	1595pcs 55 pcs / lot	0	JESD22-A104

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

### IV. Reliability Evaluation

**FIT rate (per billion): 7**

**MTTF = 15704 years**

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AO4435/L). Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion hours.

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

$$= 1.83 \times 10^9 / [2 \times (2 \times 77 \times 168 + 3 \times 2 \times 77 \times 1000) \times 258] = 7$$

$$\text{MTTF} = 10^9 / \text{FIT} = 1.38 \times 10^8 \text{hrs} = 15704 \text{ years}$$

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

**N** = Total Number of units from HTRB and HTGB tests

**H** = Duration of HTRB/HTGB testing

**Af** = Acceleration Factor from Test to Use Conditions (Ea = 0.7eV and Tuse = 55°C)

Acceleration Factor [Af] = **Exp** [Ea / k (1/Tj u - 1/Tj s )]

**Acceleration Factor ratio list:**

	55 deg C	70 deg C	85 deg C	100 deg C	115 deg C	130 deg C	150 deg C
<b>Af</b>	<b>258</b>	<b>87</b>	<b>32</b>	<b>13</b>	<b>5.64</b>	<b>2.59</b>	<b>1</b>

**Tj s** = Stressed junction temperature in degree (Kelvin), K = C+273.16

**Tj u** = The use junction temperature in degree (Kelvin), K = C+273.16

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