



AOS Semiconductor Product Reliability Report

AO4450/L, revA

Plastic Encapsulated Device

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This AOS product reliability report summarizes the qualification result for AO4450/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 AO4450/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 AO4450 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications. Standard Product AO4450 is Pb-free (meets ROHS & Sony 259 specifications). AO4450L is a Green Product ordering option. AO4450 and AO4450L are electrically identical.

- RoHS Compliant
- AO4450L is Halogen Free

Detailed information refers to datasheet.

II. Die / Package Information:

	AO4450/L
Process	Standard sub-micron
	Low voltage N channel
Package Type	8 lead SOIC
Lead Frame	Copper
Die Attach	Ag Epoxy
Bonding Wire	Au & Cu wire
Mold Material	Epoxy resin with silica filler
Flammability Rating	UL-94 V-0
MSL (moisture sensitive level)	Level 1 based on J-STD-020

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

III. Result of Reliability Stress for AO4450/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 2 lots (Note A*)	231pcs 77pcs / lot	0	JESD22-A108
HTRB	Temp = 150 °c, Vds=80% of Vdsmax	168hrs 500 hrs 1000 hrs	1 lot 2 lots (Note A*)	231pcs 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): 9

MTTF = 12392 years

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AO4450/L). Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion hours.

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

$$= 1.83 \times 10^9 / [2 \times (2 \times 77 \times 500 + 2 \times 2 \times 77 \times 1000) \times 258] = 9$$

$$\text{MTTF} = 10^9 / \text{FIT} = 1.09 \times 10^8 \text{hrs} = 12392 \text{ years}$$

Chi² = 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
Af	258	87	32	13	5.64	2.59	1

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 10⁻⁵eV / K