ALPHA & OMEGA SEMICONDUCTOR

AOS Semiconductor
Product Reliability Report

AO4435/L, rev C

Plastic Encapsulated Device

ALPHA & OMEGA Semiconductor, Inc

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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:

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

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

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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℃ /85%RH +3 cycle reflow@260℃	-	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.

Failure Rate = $Chi^2 \times 10^9$ **/ [**2 (N) (H) (Af)**]**
= 1.83×10^9 **/ [**2 x (2x77x168+3x2x77x1000) x 258**]** = 7
MTTF = 10^9 / FIT = 1.38 x 10^8hrs = 15704 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℃)
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