



**ALPHA & OMEGA**  
SEMICONDUCTOR

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

**AO8830/AO8830L, rev A**

**Plastic Encapsulated Device**

**ALPHA & OMEGA Semiconductor, Inc**

**495 Mercury Drive  
Sunnyvale, CA 94085  
U.S.**

**Tel: (408) 830-9742**

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

This AOS product reliability report summarizes the qualification result for AO8830/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 AO8830/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 AO8830/L uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 1.8V while retaining a 12V  $V_{GS(MAX)}$  rating. This device is suitable for use as a uni-directional or bi-directional load switch, facilitated by its common-drain configuration. AO8830 and AO8830L are electrically identical.

-RoHS Compliant

-AO8830L is Halogen Free

Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted			
Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current <sup>A</sup>	$I_D$	$T_A=25^\circ\text{C}$	A
		$T_A=70^\circ\text{C}$	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	30	
Power Dissipation <sup>A</sup>	$P_D$	$T_A=25^\circ\text{C}$	W
		$T_A=70^\circ\text{C}$	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

Thermal Characteristics					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10\text{s}$	$R_{\theta JA}$	64	83	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State		115	140	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	70	85	$^\circ\text{C/W}$

## II. Die / Package Information:

	<b>AO8830</b>	<b>AO8830L (Green Compound)</b>
<b>Process</b>	Standard sub-micron Low voltage N channel process	Standard sub-micron low voltage N channel process
<b>Package Type</b>	TSSOP-8	TSSOP-8
<b>Lead Frame</b>	Cu, S/pad, Ag spot	Cu, S/pad, Ag spot
<b>Die Attach</b>	Ag epoxy	Ag epoxy
<b>Bond wire</b>	2 mils Au wire	2 mils Au wire
<b>Mold Material</b>	Epoxy resin with silica filler	Epoxy resin with silica filler
<b>Flammability Rating</b>	UL-94 V-0	UL-94 V-0
<b>Backside Metallization</b>	Ti / Ni / Ag	Ti / Ni / Ag
<b>Moisture Level</b>	Up to Level 1 *	Up to Level 1 *

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

## III. Result of Reliability Stress for AO8830 (Standard) & AO8830L (Green)

Test Item	Test Condition	Time Point	Lot Attribution	Total Sample size	Number of Failures
<b>Solder Reflow Precondition</b>	Standard: 1hr PCT+3 cycle reflow @260°C Green: 168hr 85°C /85RH +3 cycle reflow @260°C	-	Standard: 11 lots Green: 4 lots	1705 pcs	0
<b>HTGB</b>	Temp = 150°C , Vgs=100% of Vgsmax	168hrs 500 hrs 1000 hrs	2 lots  (Note A*)	154 pcs  77 pcs / lot	0
<b>HTRB</b>	Temp = 150°C , Vds=80% of Vdsmax	168hrs 500 hrs 1000 hrs	2 lots  (Note A*)	154 pcs  77 pcs / lot	0
<b>HAST</b>	130 +/- 2°C , 85%RH, 33.3 psi, Vgs = 80% of Vgs max	100 hrs	Standard: 6 lots Green: 4 lots  (Note B**)	550 pcs  55 pcs / lot	0
<b>Pressure Pot</b>	121°C , 29.7psi, RH=100%	96 hrs	Standard: 11 lots Green: 4 lots  (Note B**)	825 pcs  55 pcs / lot	0
<b>Temperature Cycle</b>	-65°C to 150°C , air to air,	250 / 500 cycles	Standard: 3 lots Green: 3 lots  (Note B**)	330 pcs  55 pcs / lot	0

### III. Result of Reliability Stress for AO8830 (Standard) & AO8830L (Green) Continues

<b>DPA</b>	Internal Vision Cross-section X-ray	NA	5	5	0
			5	5	
			5	5	
<b>CSAM</b>		NA	5	5	0
<b>Bond Integrity</b>	Room Temp	0hr	40	40 wires	0
	150°C bake	250hr	40	40 wires	
	150°C bake	500hr	40	40 wires	
<b>Solderability</b>	245°C	5 sec	15	15 leads	0

**Note A:** The HTGB and HTRB reliability data presents total of available AO8830/L burn-in data up to the published date.

**Note B:** The pressure pot, temperature cycle and HAST reliability data for AO8830/L comes from the AOS generic package qualification data.

### IV. Reliability Evaluation

**FIT rate (per billion): 23**

**MTTF = 4957 years**

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AOB414). Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion hours.

$$\text{Failure Rate} = \text{Chi}^2 \times 10^9 / [2 (N) (H) (Af)] = 1.83 \times 10^9 / [2 \times 4 \times 77 \times 500 \times 258] = 23$$

$$\text{MTTF} = 10^9 / \text{FIT} = 4.34 \times 10^7 \text{ hrs} = 4957 \text{ years}$$

**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)

$$\text{Acceleration Factor [Af]} = \text{Exp} [Ea / k (1/Tj) - 1/Tj \text{ s}]$$

**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>

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

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

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