AOS Semiconductor
Product Reliability Report

AO4850/AO4850L, rev A

Plastic Encapsulated Device

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This AOS product reliability report summarizes the qualification result for AO4850. 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 AO4850 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 AO4850 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The two MOSFETs may be used in H-bridge, Inverters and other applications.

Absolute Maximum Ratings T_A=25°C unless otherwise noted					
Parameter		Symbol	Maximum 10 Sec	Maximum Steady State	Units
Drain-Source Voltage		V_{DS}	75		V
Gate-Source Voltage		V_{GS}	±25		V
Continuous Drain Current [A]	T_A=25°C	I_D	3.1	2.3	A
	T_A=70°C		2.4	1.8	
Pulsed Drain Current [B]		I_{DM}	15		
Power Dissipation	T_A=25°C	P_D	2	1.1	W
	T_A=70°C		1.3	0.7	
Avalanche Current [B]		I_{AR}	10		A
Repetitive avalanche energy 0.3mH [B]		E_{AR}	15		mJ
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150		°C

Thermal Characteristics					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	50	62.5	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		82	110	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	41	50	°C/W

II. Die / Package Information:

	AO4850	AO4850L (Green Compound)
Process	Standard sub-micron Low voltage N channel, Integrated Schottky diode	Standard sub-micron
Package Type	8 lead SOIC	8 lead SOIC
Lead Frame	Cu, D/pad, Ag spot	Cu, D/pad, Ag spot
Die Attach	Ag epoxy	Ag epoxy
Bond wire	S: Cu 2mils; G: Au 1.3mils	S: Cu 2mils; G: Au 1.3mils
Mold Material	Epoxy resin with silica filler	Epoxy resin with silica filler
Flammability Rating	UL-94 V-0	UL-94 V-0
Backside Metallization	Ti / Ni / Ag	Ti / Ni / Ag
Moisture Level	Up to Level 1 *	Up to Level 1*

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

III. Result of Reliability Stress for AO4850 (Standard) & AO4850L (Green)

Test Item	Test Condition	Time Point	Lot Attribution	Total Sample size	Number of Failures
Solder Reflow Precondition	Standard: 1hr PCT+3 cycle reflow@260°c Green: 168hr 85°c /85%RH +3 cycle reflow@260°c	-	Standard: 83 lots Green: 29 lots	17380 pcs	0
HTGB	Temp = 150°c, Vgs=100% of Vgsmax	168 hrs 500 hrs 1000 hrs	1 lot (Note A*)	82 pcs 77+5 pcs / lot	0
HTRB	Temp = 150°c, Vds=80% of Vdsmax	168 hrs 500 hrs 1000 hrs	1 lot (Note A*)	82 pcs 77+5 pcs / lot	0
HAST	130 +/- 2°c, 85%RH, 33.3 psi, Vgs = 80% of Vgs max	100 hrs	Standard: 81 lots Green: 16 lots (Note B**)	5335 pcs 50+5 pcs / lot	0
Pressure Pot	121°c, 29.7psi, RH=100%	96 hrs	Standard: 83 lots Green: 20 lots (Note B**)	5665 pcs 50+5 pcs / lot	0
Temperature Cycle	-65°c to 150°c, air to air	250 / 500 cycles	Standard: 87 lots Green: 29 lots (Note B**)	6380 pcs 50+5 pcs / lot	0

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III. Result of Reliability Stress for AO4850 (Standard) & AO4850L (Green)

Continues

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

Note A: The HTGB and HTRB reliability data presents total of available AO4850 and AO4850L burn-in data up to the published date.
Note B: The pressure pot, temperature cycle and HAST reliability data for AO4850 and AO4850L comes from the AOS generic package qualification data.

IV. Reliability Evaluation

FIT rate (per billion): 128
MTTF = 887 years

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AO4850). 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 164 x 168 x 258**]** = 128
MTTF = 10^9 / FIT =7.77×10^6hrs = 887 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, 8.617164×10^{-5}eV / K