AOS Semiconductor
Product Reliability Report

AON6405L rev A

Plastic Encapsulated Device

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This AOS product reliability report summarizes the qualification result for AON6405L. 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 AON6405L 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 AON6405L combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.This device is ideal for load switch and battery protection applications.

-RoHs Compliant
-Halogen Free

Absolute Maximum Ratings T_A=25°C unless otherwise noted				
Parameter		**Symbol**	**Maximum**	**Units**
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [G]	T_C=25°C	I_D	-30	A
	T_C=100°C		-23	
Pulsed Drain Current [C]		I_{DM}	-160	
Continuous Drain Current	T_A=25°C	I_{DSM}	-15	A
	T_A=70°C		-12	
Avalanche Current [C]		I_{AR}	-54	A
Repetitive avalanche energy L=0.1mH [C]		E_{AR}	146	mJ
Power Dissipation [B]	T_C=25°C	P_D	83	W
	T_C=100°C		33	
Power Dissipation [A]	T_A=25°C	P_{DSM}	2.5	W
	T_A=70°C		1.6	
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	$R_{\theta JA}$	14.2	17	°C/W
Maximum Junction-to-Ambient [AD]	Steady-State		42	50	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.2	1.5	°C/W

II. Die / Package Information:

	AON6405L
Process	Standard sub-micron Low voltage P channel process
Package Type	8 leads DFN 5x6
Lead Frame	A194, Ag spot
Die Attach	84-1LMISR4
Bond wire	S: Cu 2mils; G: Au 1.3mils
Mold Material	Epoxy resin with silica filler
Flammability Rating	UL-94 V-0
Moisture Level	Up to Level 1 *

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

III. Result of Reliability Stress for AON6405L

Test Item	Test Condition	Time Point	Lot Attribution	Total Sample size	Number of Failures
Solder Reflow Precondition	168hr 85°c /85%RH +3 cycle reflow @260°c	-	2 lots	330 pcs	0
HTGB	Temp = 150°c , Vgs=100% of Vgsmax	168hrs 500 hrs 1000 hrs	1 lot (Note A*)	77 pcs 77pcs / lot	0
HTRB	Temp = 150°c , Vds=80% of Vdsmax	168hrs 500 hrs 1000 hrs	1 lot (Note A*)	77 pcs 77pcs / lot	0
HAST	130 +/- 2°c , 85%RH, 33.3 psi, Vgs = 80% of Vgs max	100 hrs	2 lots	110 pcs 55 pcs / lot	0
Pressure Pot	121°c , 29.7psi, RH=100%	96 hrs	2 lots	110 pcs 55 pcs / lot	0
Temperature Cycle	-65°c to 150°c , air to air	250 / 500 cycles	2 lots	110 pcs 55 pcs / lot	0

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III. Result of Reliability Stress for AON6405L

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 AON6405L burn-in data up to the published date.

IV. Reliability Evaluation

FIT rate (per billion): 46
MTTF = 2478 years

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AO6405L). 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 / **[**2x2x77x500x258**] =** 46
MTTF = 10^9 / FIT = 2.17×10^7hrs = 2478 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