ALPHA & OMEGA SEMICONDUCTOR

AOS Semiconductor
Product Reliability Report

AO4722, rev B

Plastic Encapsulated Device

ALPHA & OMEGA Semiconductor, Inc

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This AOS product reliability report summarizes the qualification result for AO4722. 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 AO4722 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 AO4722 uses advanced trench technology with a monolithically integrated Schottky diode to provide excellent $R_{DS(ON)}$,and low gate charge. This device is suitable for use as a low side FET in SMPS, load switching and general purpose applications.

-RoHS Compliant
-Halogen Free

Detailed information refers to datasheet.

II. Die / Package Information:

	AO4722
Process	Standard sub-micron 30V N-Channel MOSFET
Package Type	SO8
Lead Frame	Cu
Die Attach	Ag epoxy
Bonding	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 AO4722

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	-	33 lots	5489pcs	0	JESD22-A113
HTGB	Temp = 150 °c, Vgs=100% of Vgsmax	168hrs 500 hrs 1000 hrs	2 lot 3 lot 3 lot (Note A*)	616pcs 77pcs / lot	0	JESD22-A108
HTRB	Temp = 150 °c, Vds=80% of Vdsmax	168hrs 500 hrs 1000 hrs	2 lot 3 lot 3 lot (Note A*)	616pcs 77pcs / lot	0	JESD22-A108
HAST	130°c, 85%RH, 33.3 psi, Vgs = 100% of Vgs max	96 hrs	20 lots (Note A*)	1100pcs 55 pcs / lot	0	JESD22-A110
Pressure Pot	121°c, 29.7psi, RH=100%	96 hrs	24lots (Note A*)	1848pcs 77 pcs / lot	0	JESD22-A102
Temperature Cycle	-65°c to 150°c, air to air	250 / 500 cycles	33 lots (Note A*)	2541pcs 77 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): 5
MTTF = 23972 years

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AO4722). 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 (4x77x168 +6x77x500 +6x77x1000) x 258**] =** 5
MTTF = 10^9 / FIT = 2.10×10^8hrs = 23972 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, 8.617164×10^{-5}eV / K