ALPHA & OMEGA SEMICONDUCTOR

AOS Semiconductor Product Reliability Report

AOD413A, rev D

Plastic Encapsulated Device

ALPHA & OMEGA Semiconductor, Inc

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This AOS product reliability report summarizes the qualification result for AOD413A. 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 AOD413A 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 AOD413A uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. With the excellent thermal resistance of the DPAK package, this device is well suited for high current load applications.

-RoHS Compliant
-Halogen Free

Detailed information refers to datasheet.

II. Die / Package Information:

	AOD413A
Process	Standard sub-micron Low voltage P channel process
Package Type	3 leads TO252
Lead Frame	Bare Cu
Die Attach	Soft solder
Bond wire	Al & Au wire
Mold Material	Epoxy resin with silica filler
Moisture Level	Up to Level 1 *

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

III. Result of Reliability Stress for AOD413A

Test Item	Test Condition	Time Point	Lot Attribution	Total Sample size	Number of Failures
MSL Precondition	168hr 85°c /85%RH +3 cycle reflow@260°c	-	9 lots	1210pcs	0
HTGB	Temp = 150°c , Vgs=100% of Vgsmax	168hrs 500 hrs 1000 hrs	1 lot 1 lot 1 lot (Note A*)	231pcs 77pcs / lot	0
HTRB	Temp = 150°c , Vds=80% of Vdsmax	168hrs 500 hrs 1000 hrs	1 lot 1 lot 1 lot (Note A*)	231pcs 77pcs / lot	0
HAST	130 +/- 2°c , 85%RH, 33.3 psi, Vgs = 100% of Vgs max	100 hrs	9 lots (Note A*)	495pcs 55 pcs / lot	0
Pressure Pot	121°c , 29.7psi, RH=100%	96 hrs	5 lots (Note A*)	275pcs 55 pcs / lot	0
Temperature Cycle	-65°c to 150°c , air to air,	250 / 500 cycles	8 lots (Note A*)	440pcs 55 pcs / lot	0

Note A: The reliability data presents total of available generic data up to the published date.

IV. Reliability Evaluation

FIT rate (per billion): 14
MTTF = 8268 years

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AOD413A). 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 **/ [**2x (2x77x168+2x77x500+2x77x1000) x258**]** = 14
MTTF = 10^9 / FIT = 7.24×10^7hrs = 8268 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