ALPHA & OMEGA SEMICONDUCTOR

# *AOS Semiconductor*
# *Product Reliability Report*

## AOW418, rev A

**Plastic Encapsulated Device**

**ALPHA & OMEGA Semiconductor, Inc**

**www.aosmd.com**

ALPHA & OMEGA SEMICONDUCTOR

This AOS product reliability report summarizes the qualification result for AOW418. 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 AOW418 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.

## Table of Contents:



## I. Product Description:

The AOW418 is fabricated with SDMOS™ trench technology that combines excellent $R_{DS(ON)}$ with low gate charge and low Qrr. The result is outstanding efficiency with controlled switching behavior. This universal technology is well suited for PWM, load switching and general purpose applications.

-RoHS Compliant
-Halogen Free

Details refer to the datasheet.

## II. Die / Package Information:

| | **AOW418** |
|---|---|
| **Process** | Standard sub-micron<br>Low voltage N channel process |
| **Package Type** | 3 leads TO262 |
| **Lead Frame** | Bare Cu |
| **Die Attach** | Soft solder |
| **Bond wire** | Al 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

ALPHA & OMEGA SEMICONDUCTOR

## III. Result of Reliability Stress for AOW418

| Test Item | Test Condition | Time Point | Lot Attribution | Total Sample size | Number of Failures | Reference Standard |
|---|---|---|---|---|---|---|
| MSL Precondition | 168hr 85°c /85%RH +3 cycle reflow@250°c | - | 3 lots | 627pcs | 0 | JESD22-A113 |
| HTGB | Temp = 150°c , Vgs=100% of Vgsmax | 168hrs<br>500 hrs<br>1000 hrs | 2 lots<br>2 lots<br>(Note A*) | 308pcs<br>77 pcs / lot | 0 | JESD22-A108 |
| HTRB | Temp = 150°c , Vds=80% of Vdsmax | 168hrs<br>500 hrs<br>1000 hrs | 2 lots<br>2 lots<br>(Note A*) | 308pcs<br>77 pcs / lot | 0 | JESD22-A108 |
| HAST | 130 +/- 2°c , 85%RH, 33.3 psi, Vgs = 100% of Vgs max | 100 hrs | 3 lots<br>(Note A*) | 165pcs<br>55 pcs / lot | 0 | JESD22-A110 |
| Pressure Pot | 121°c , 29.7psi, RH=100% | 96 hrs | 3 lots<br>(Note A*) | 231pcs<br>77 pcs / lot | 0 | JESD22-A102 |
| Temperature Cycle | -65°c to 150°c , air to air, | 250 / 500 cycles | 3 lots<br>(Note A*) | 231pcs<br>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): 17
## MTTF = 6622 years

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AOW418). 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)**]**

= $1.83 \times 10^9$ **/ [**2x (2x2x77x168+2x2x77x500) x258**]** = 17

**MTTF =** $10^9$ / FIT = $5.80 \times 10^7$hrs = 6622 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, $8.617164 \times 10^{-5}$eV / K