ALPHA & OMEGA SEMICONDUCTOR

Alpha & Omega Semiconductor Product Reliability Qualification Report

AONS36333, rev B

Plastic Encapsulated Device

ALPHA & OMEGA Semiconductor, Inc

www.aosmd.com

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The report summarizes the AOS product reliability qualification results. Accelerated environmental tests are performed on a specific sample size and samples are electrically tested before and after each time point. Review of final electrical test results confirms that the product passes the AOS quality and reliability requirements based on **JEDEC** and may reference existing qualification results of similar products, which is justified by the structural similarity of the products. The released product will be categorized by its process family and routinely monitored for continuous improvement of product quality.

I. Reliability Stress Test Summary and Results

Test Item	Test Condition	Time Point	Total Sample Size	Number of Failures	Reference Standard
HTGB	**Temp = 150°C Vgs=100% of Vgsmax**	**1000 hrs**	**231 pcs**	**0**	**JESD22-A108**
HTRB	**Temp = 150°C Vds=100% of Vdsmax**	**1000 hrs**	**231 pcs**	**0**	**JESD22-A108**
Precondition	**168hr, 85°C, 85%RH, 3 cycle reflow @ 260°C (MSL 1)**	**-**	**231*3 pcs**	**0**	**JESD22-A113 J-STD-020**
HAST	**130°C, 85%RH, 33.3 psia, Vds = 80% of Vdsmax up to 42V**	**96 hrs**	**231 pcs**	**0**	**JESD22-A110**
H3TRB	**85°C, 85%RH, Vds = 80% of Vdsmax up to 100V**	**1000 hrs**	**231 pcs**	**0**	**JESD22-A101**
Autoclave	**121°C, 100%RH, 29.7psia**	**96 hrs**	**231 pcs**	**0**	**JESD22-A102**
Temperature Cycle	**-65°C to 150°C, air to air**	**1000 cycles**	**231 pcs**	**0**	**JESD22-A104**
IOL	**ΔTj = 100°C t_{on} = 2 minutes t_{off} = 2 minutes**	**15000 cycles**	**231 pcs**	**0**	**MIL-STD-750 Method 1037**
ESD_HBM	**Class H1A (251V~500V)**	**-**	**30 pcs**	**0**	**AEC-Q101-001**
ESD_CDM	**Class C5 (>1000V)**	**-**	**30 pcs**	**0**	**AEC-Q101-005**

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

II. Reliability Evaluation

FIT rate (per billion): 7.63
MTTF = 14960 years

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size. Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion hours.

At 60% Confidence Level

Failure Rate = $Chi^2 \times 10^9$ **/ [**2 (N) (H) (Af)**] =** 7.63
MTTF = 10^9 / FIT = 14960 years

Chi^2 = Chi Squared Distribution, determined by the number of failures and confidence interval
N = Total Number of units from burn-in tests

H = Duration of burn-in testing
Af = Acceleration Factor from Test to Use Conditions (Ea = 0.7eV and T_{use} = 55°C)
Acceleration Factor [**Af**] = **Exp** [Ea / **k** ($1/T_J$ u – $1/T_J$ 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	**259**	**87**	**32**	**13**	**5.64**	**2.59**	**1**

T_J s = Stressed junction temperature in degree (Kelvin), K = C + 273.16
T_J u =The use junction temperature in degree (Kelvin), K = C + 273.16
k = Boltzmann's constant, 8.617164 X 10^{-5}eV / K