



# ***AOS Semiconductor Product Reliability Report***

**AOB10B60D**, rev A

**Plastic Encapsulated Device**

**ALPHA & OMEGA Semiconductor, Inc**

**[www.aosmd.com](http://www.aosmd.com)**

This AOS product reliability report summarizes the qualification result for AOB10B60D. 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 AOB10B60D passes AOS quality and reliability requirements.

## Table of Contents:

- I. Product Description
- II. Package and Die information
- III. Environmental Stress Test Summary and Result
- IV. Reliability Evaluation
- V. Appendix: Test data

### I. Product Description:

The Alpha IGBT™ line of products offers best-in-class performance in conduction and switching losses, with robust short circuit capability. They are designed for ease of paralleling, minimal gate spike under high dV/dt conditions and resistance to oscillations. The soft copackage diode is targeted for minimal losses in motor control applications.

Details refer to the datasheet.

### II. Die / Package Information:

	<b>AOB10B60D</b>
<b>Process</b>	Standard sub-micron 600V <i>Alpha IGBT™</i> with Diode
<b>Package Type</b>	TO263
<b>Lead Frame</b>	Bare Cu
<b>Die Attach</b>	Soft solder
<b>Bonding</b>	Al wire
<b>Mold Material</b>	Epoxy resin with silica filler
<b>Moisture Level</b>	Up to Level 1

### III. Result of Reliability Stress for AOB10B60D

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 @260°C	-	9 lots	2079pcs	0	JESD22-A113
HTGB	Temp = 150°C , Vge=100% of Vgmax	168hrs 500 hrs 1000 hrs	3 lots 5 lots	616pcs 77 pcs / lot	0	JESD22-A108
HTRB	Temp = 150°C , Vce=80% of Vcmax	168hrs 500 hrs 1000 hrs	3 lots 5 lots	616pcs 77 pcs / lot	0	JESD22-A108
HAST	130°C , 85%RH, 33.3 psi, Vce = 80% of Vcmax before arcing (typically ≤42V)	96 hrs	9 lots  (Note A*)	693pcs 77 pcs / lot	0	JESD22-A110
Pressure Pot	121°C , 29.7psi, RH=100%	96 hrs	9 lots  (Note A*)	693pcs 77 pcs / lot	0	JESD22-A102
Temperature Cycle	-65°C to 150°C , air to air,	250 / 500 cycles	9 lots  (Note A*)	693pcs 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): 3.52**

**MTTF = 32413 years**

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AOB10B60D). Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion hours.

$$\text{Failure Rate (FIT)} = \text{Chi}^2 \times 10^9 / [2 (N) (H) (Af)]$$

$$= 1.84 \times 10^9 / [2 \times (6 \times 77 \times 500 + 10 \times 77 \times 1000) \times 259] = 3.52$$

$$\text{MTTF} = 10^9 / \text{FIT} = 2.84 \times 10^8 \text{hrs} = 32413 \text{ years}$$

**Chi<sup>2</sup>** = 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] =  $\text{Exp} [Ea / k (1/Tj u - 1/Tj s)]$

**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	259	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 x 10<sup>-5</sup>eV / K