



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

**AOTF10T60**, rev B

**Plastic Encapsulated Device**

**ALPHA & OMEGA Semiconductor, Inc**

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

This AOS product reliability report summarizes the qualification result for AOTF10T60. 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 AOTF10T60 passes AOS quality and reliability requirements.

## Table of Contents:

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

### I. Product Description:

The AOTF10T60 is fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications. By providing low  $R_{DS(on)}$ ,  $C_{iss}$  and  $C_{rss}$  along with guaranteed avalanche capability this parts can be adopted quickly into new and existing offline power supply designs.

For Halogen Free add "L" suffix to part number:  
AOTF10T60L

Details refer to the datasheet.

### II. Die / Package Information:

	<b>AOTF10T60</b>
<b>Process</b>	Standard sub-micron 600V N-Channel MOSFET
<b>Package Type</b>	TO220F
<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 AOTF10T60

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	-	21 lots	4158pcs	0	JESD22-A113
HTGB	Temp = 150°C , Vgs=100% of Vgsmax	168hrs 500 hrs 1000 hrs	2 lots 3 lots 6 lots	847pcs 77 pcs / lot	0	JESD22-A108
HTRB	Temp = 150°C , Vds=80% of Vdsmax	168hrs 500 hrs 1000 hrs	2 lots 3 lots 6 lots	847pcs 77 pcs / lot	0	JESD22-A108
HAST	130°C , 85%RH, 33.3 psi, Vgs = 100% of Vgs max	96 hrs	15 lots  (Note A*)	1155pcs 77 pcs / lot	0	JESD22-A110
Pressure Pot	121°C , 29.7psi, RH=100%	96 hrs	18 lots  (Note A*)	1386pcs 77 pcs / lot	0	JESD22-A102
Temperature Cycle	-65°C to 150°C , air to air,	250 / 500 cycles	21 lots  (Note A*)	1617pcs 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): 2.92**

**MTTF = 39075 years**

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AOTF10T60). Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion hours.

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

$$= 1.83 \times 10^9 / [2 \times (4 \times 77 \times 168 + 6 \times 77 \times 500 + 12 \times 77 \times 1000) \times 259] = 2.92$$

$$\text{MTTF} = 10^9 / \text{FIT} = 3.42 \times 10^8 \text{hrs} = 39075 \text{ years}$$

**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**] = **Exp**<sup>[Ea / k (1/Tj u - 1/Tj s)]</sup>

**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
<b>Af</b>	<b>259</b>	<b>87</b>	<b>32</b>	<b>13</b>	<b>5.64</b>	<b>2.59</b>	<b>1</b>

**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