



AOS Semiconductor Product Reliability Report

AOTF7T60, rev A

Plastic Encapsulated Device

ALPHA & OMEGA Semiconductor, Inc

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This AOS product reliability report summarizes the qualification result for AOTF7T60. 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 AOTF7T60 passes AOS quality and reliability requirements.

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I. Product Description:

The AOTF7T60 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 RDS(on), Ciss and Crss 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:
AOTF7T60L

Details refer to the datasheet.

II. Die / Package Information:

| | |
|--|--|
| | AOTF7T60 |
| Process | Standard sub-micron 600V N-Channel MOSFET |
| Package Type | TO220F |
| Lead Frame | Bare Cu |
| Die Attach | Soft solder |
| Bonding | 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 | |

III. Result of Reliability Stress for AOTF7T60

| 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 |

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 (AOTF7T60). Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion hours.

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

$$= 1.83 \times 10^9 / [2x (4x77x168 + 6x77x500 + 12x77x1000) x259] = 2.92$$

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

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°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 10⁻⁵eV / K