



AOS Semiconductor Product Reliability Report

AOW20C60, rev A

Plastic Encapsulated Device

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This AOS product reliability report summarizes the qualification result for AOW20C60. 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 AOW20C60 passes AOS quality and reliability requirements.

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I. Product Description:

The AOW20C60 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.

Details refer to the datasheet.

II. Die / Package Information:

| | |
|-----------------------|--|
| | AOW20C60 |
| Process | Standard sub-micron 600V N-Channel MOSFET |
| Package Type | TO262 |
| Lead Frame | Bare Cu |
| Die Attach | Soft solder |
| Bonding | Al wire |
| Mold Material | Epoxy resin with silica filler |
| Moisture Level | Up to Level 1 |

III. Result of Reliability Stress for AOW20C60

| 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 | - | 12 lots | 2541pcs | 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 | 9 lots (Note A*) | 693pcs 77 pcs / lot | 0 | JESD22-A110 |
| Pressure Pot | 121°C , 29.7psi, RH=100% | 96 hrs | 12 lots (Note A*) | 924pcs 77 pcs / lot | 0 | JESD22-A102 |
| Temperature Cycle | -65°C to 150°C , air to air, | 250 / 500 cycles | 12 lots (Note A*) | 924pcs 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 (AOW20C60). 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**] = **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