



ALPHA & OMEGA
SEMICONDUCTOR

AOS Semiconductor Product Reliability Report

AOK20B120E1, rev C

Plastic Encapsulated Device

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This AOS product reliability report summarizes the qualification result for AOK20B120E1. 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 AOK20B120E1 passes AOS quality and reliability requirements. The released product will be categorized by the process family and be routine monitored for continuously improving the 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 = 175°C , Vge=100% of Vgemax | 168 / 500 / 1000 hours | 693 pcs | 0 | JESD22-A108 |
| HTRB | Temp = 175°C , Vce=80% of Vcemax | 168 / 500 / 1000 hours | 693 pcs | 0 | JESD22-A108 |
| HAST | 130°C , 85%RH, 33.3 psia, Vce = 80% of Vcemax up to 42V | 96 hours | 693 pcs | 0 | JESD22-A110 |
| H3TRB | 85°C , 85%RH, Vce = 80% of Vcemax up to 100V | 1000 hours | 693 pcs | 0 | JESD22-A101 |
| Autoclave | 121°C , 29.7psia, RH=100% | 96 hours | 924 pcs | 0 | JESD22-A102 |
| Temperature Cycle | -65°C to 150°C , air to air, | 1000 cycles | 924 pcs | 0 | JESD22-A104 |
| HTSL | Temp = 175°C | 1000 hours | 693 pcs | 0 | JESD22-A103 |
| IOL | Δ Tj = 100°C | 6000 cycles | 693 pcs | 0 | AEC Q101 |
| Resistance to Solder Heat | Temp = 270°C | 15 seconds | 30 pcs | 0 | JESD22-B106 |

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

II. Reliability Evaluation

FIT rate (per billion): 0.87

MTTF = 131010 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.

Failure Rate = $\text{Chi}^2 \times 10^9 / [2 (N) (H) (Af)] = 0.87$

MTTF = $10^9 / \text{FIT} = 131010$ years

Chi² = 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 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 | 125 deg C | 150 deg C | 175 deg C |
|-----------|------------|------------|-----------|-----------|------------|------------|-----------|
| Af | 758 | 256 | 95 | 38 | 9.7 | 2.9 | 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, $8.617164 \times 10^{-5} \text{eV} / \text{K}$