

# Reliability Qualification Report

for

**4Gb 3.3V Parallel NAND FLASH  
with Pb/Halogen Free  
(Industrial)**

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## 1. Title

This report describes the reliability and qualification data of Alliance product listed below. The qualification and reliability tests have been completed successfully based on Alliance standard.

## 2. Product and Package Information

Product Code	: AS9F34G08SA-25BIN
Operating Temperature	: -40°C to +85°C
Package Type	: FBGA 63B (9.0x11.0mm, 1.0T)
Flammability	: UL-V0
Solder ball	: SAC1205N (98.25% Sn / 1.2% Ag / 0.5% Cu / 0.05% Ni)

## 3. Result Summary

Lifetime Simulation Tests	: Passed ELFR & HTOL
Environment Stress Tests	: Passed All Tests
ESD & Latch-up	: Passed HBM 2000V, CDM 500V & Latch-up ±500mA

## 4. Accelerated Lifetime Simulation Tests

Group	Test Item / Conditions	Test Method	Duration or Level	Result	Notes
				Failed Q'ty / Tested Q'ty	
Accelerated Lifetime Simulation Tests	<b>Early Life Failure Rate</b> 125°C, Dynamic stress	JESD22-A108	48 hours	0 / 1000 (Passed)	1, 2
	<b>High Temperature Operating Life</b> 125°C, Dynamic stress	JESD22-A108	1000 hours	0 / 116 (Passed)	1, 2
	<b>Endurance</b> 25°C, Dynamic stress, Program/Read"0"/Erase/Read "1" cycling	JESD22-A117	100k cycles	0 / 231 (Passed)	1,2
	<b>High Temperature Data Retention</b> 125°C, All bit cells programmed Preconditioning : 10k Endurance test at high temperature above	JESD22-A117	100 hours	0 / 231 (Passed)	1

**Note :**

- 1) Electrical test is performed before and after each item.
- 2) "Dynamic stress" means continuous memory operation like read or write function.

## \* Failure Rate Estimation

### Estimation Condition :

User Operating Temperature : 55°C

User Operating Voltage : Worst case (Maximum Operating Voltage in the Datasheet)

Confidence Level : 60%

### NAND :

Early Life ( $E_a = 0.7 \text{ eV}$ ,  $\beta = 8$ ) : 55.39 FITs

Inherent Life ( $E_a = 0.7 \text{ eV}$ ,  $\beta = 8$ ) : 30.32 FITs

## 5. Accelerated Environment Stress Tests

Group	Test Item / Conditions	Test Method	Duration or Level	Result	Notes
				Failed Q'ty / Tested Q'ty	
Accelerated Environment Stress Tests	<b>Preconditioning</b> Temperature Cycling : -55°C to 125°C Bake : 125°C Soak : 30°C, 60% RH Reflow : 260°C	JESD22-A113	<b>Level 3</b> 5 cycles 24 hours 192 hours 3 cycles	0 / 45 (Passed)	1
	<b>Unbiased HAST</b> 110°C, 85% RH	JESD22-A118	264 hours	0 / 45 (Passed)	1, 2
	<b>Temperature Cycling</b> -65°C to 150°C	JESD22-A104	1000 cycles	0 / 45 (Passed)	1, 2
	<b>High Temperature Storage Life</b> 150°C	JESD22-A103	1000 hours	0 / 45 (Passed)	1
<b>Note :</b> 1) Electrical test is performed before and after each item. 2) Preconditioning is performed before the test.					

## 6. Electrical Verification Tests (Electrostatic Discharge & Latch-up)

Group	Test Item / Conditions	Test Method	Duration or Level	Result	Notes
				Failed Q'ty / Tested Q'ty	
Electrical Verification Tests	ESD Human Body Model	JS-001-2017	2000V	0 / 9 (Passed)	1, 2
	ESD Charged Device Model	JESD22-C101	500V	0 / 3 (Passed)	1, 2
	Latch-Up (I-test)	JESD78	±500mA	0 / 6 (Passed)	1, 2

**Note :**

- 1) Electrical test is performed before and after each item.
- 2) HBM, CDM and Latch-up tests are performed at room temperature.