

Reliability Qualification Report

for

**8Gb 3.3V Parallel NAND FLASH
with Pb/Halogen Free
(Industrial)**

Issued Date: April 07, 2023

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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	: AS9F38G08SA-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	Early Life Failure Rate 125°C, Dynamic stress	JESD22-A108	48 hours	0 / 2500 (Passed)	1, 2
	High Temperature Operating Life 125°C, Dynamic stress	JESD22-A108	1008 hours	0 / 231 (Passed)	1, 2
	Endurance 25°C, Dynamic stress, Program/Read"0"/Erase/Read "1" cycling	JESD22-A117	100k cycles	0 / 231 (Passed)	1,2
	High Temperature Data Retention 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 ($E_a = 0.7 \text{ eV}$, $\beta = 8$) : 42.50 FITs (MTTF : 2,686 years)

Inherent Life ($E_a = 0.7 \text{ eV}$, $\beta = 8$) : 22.83 FITs (MTTF : 5,000 years)

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	Preconditioning Temperature Cycling : -55°C to 125°C Bake : 125°C Soak : 30°C, 60% RH Reflow : 260°C	JESD22-A113	Level 3 5 cycles 24 hours 192 hours 3 cycles	0 / 150 (Passed)	1
	Unbiased HAST 110°C, 85% RH	JESD22-A118	264 hours	0 / 75 (Passed)	1, 2
	Temperature Cycling -65°C to 150°C	JESD22-A104	500 cycles	0 / 75 (Passed)	1, 2
	High Temperature Storage Life 150°C	JESD22-A103	1008 hours	0 / 75 (Passed)	1
Note : 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.