

# Reliability Qualification Report

for

**8GB eMMC with Pb/Halogen Free  
(Industrial)**

Issued Date: April 07, 2022

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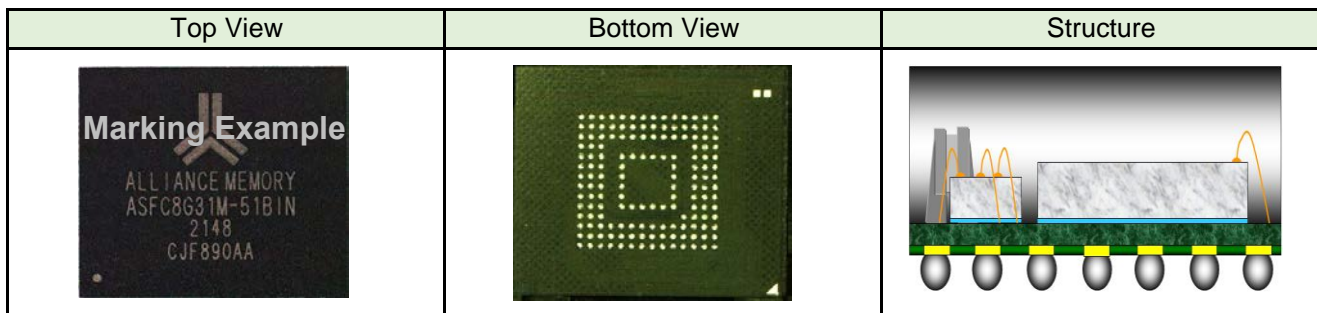
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## 1. Title

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 : ASFC8G31M-51BIN  
 Operating Temperature : -40°C to +85°C (Industrial)  
 Package Type : FBGA 153B (11.5x13.0mm, 1.0T)  
 Flammability : UL-V0  
 Solder ball : SAC305 (96.5% Sn / 3.0% Ag / 0.5% Cu)



## 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 ±150mA

## 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	96 hours	0 / 1000 (Passed)	1, 2
	<b>High Temperature Operating Life</b> 125°C, Dynamic stress	JESD22-A108	1000 hours	0 / 387 (Passed)	1, 2
	<b>Endurance</b> 25°C, Dynamic stress, Program/Read"0"/Erase/Read "1" cycling	JESD22-A117	3k cycles	0 / 231 (Passed)	1,2
	<b>Data Retention</b> 85°C, All bit cells programmed Preconditioning : 300 cylce Endurance test	JESD22-A117	Pre E/W+ 160hrs	0 / 231 (Passed)	1,3,4
	<b>Data Retention</b> 85°C, All bit cells programmed Preconditioning : 3K cylce Endurance test	JESD22-A117	Pre E/W+ 60hrs	0 / 231 (Passed)	1,3,4

**Note :**

- 1) Electrical test is performed before and after each item.  
Above data is verified by providing data randomization and 48bit/1KByte ECC with Read Retry.
- 2) "Dynamic stress" means continuous memory operation like read or write function.
- 3) 160hrs of bake time is equivalent to 3 year.  
60hrs of bake time is equivalent to 1 year.
- 4) The user's conditions of use were calculated at 40°C

## 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 / 90 (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	500 cycles	0 / 45 (Passed)	1, 2
	<b>High Temperature Storage Life</b> 150°C	JESD22-A103	1008 hours	0 / 45 (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 / 15 (Pass)	1, 2
	ESD Charged Device Model	JESD22-C101	500V	0 / 3 (Pass)	1, 2
	Latch-Up (I-test)	JESD78	±150mA	0 / 6 (Pass)	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.