Reliability Qualification Report

for

DDR4 SDRAM with Pb/Halogen Free

(20nm 8Gb DDR4 SDRAM)

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1. Information

Product	8Gb DDR4 SDRAM
Device	AS4C1G8D4* AS4C512M16D4*
Technology	20nm
Function	1G*8 DDR4 512M*16 DDR4

Package Type	78B FBGA 96B FBGA
Substrate	BT
Solder Ball	Sn-Ag-Cu solder ball
Molding Compound	Hitachi Compound
Package Size	7.5*12 mm^2 7.5*13 mm^2

2. Life Test

Test Items	Test Conditions	Sample Size	Stress Hours	Results (Number of failures)
2.1 High Temperature Operation Life Test *	Ta = 125 ℃; array VDD =1.3V	600	168hrs 500hrs 1000hrs	0/600 0/600 0/600
2.2 Low Temperature Operation Life Test *	Ta = -40 ℃; array VDD =1.3V	130	168hrs 500hrs 1000hrs	0/130 0/130 0/130

Remark:

* Preconditioning:

TC @ -40~60'C, 10 cycles => Baking @ 125℃ , 24 hours. => Soaking @ 30℃ / 60% R.H., 192 hours => IR : 3 times.

Test Items	Test Conditions	Sample Size	Stress Hours	Results (Number of failures)
2.3 Early Failure Rate	Ta = 125 ℃; array VDD = 1.3V	12,540	36hrs	0/12540

3. Environmental Test

Test Items	Test Conditions	Sample Size	Stress Hours	Results (Number of failures)
3.1 High Temperature Storage Life Test *	Ta. = 150℃	231	500hrs 1000hrs	0/231 0/231
3.2 Temperature Cycle Test *	Ta.= -55℃ / +125℃, 2 cycs/ Hr	231	500cycs 1000cycs	0/231 0/231
3.3 Highly Accelerated Stress Test *	Ta. = 130℃/ 85%RH;	231	144hrs	0/231

Remark:

*. Preconditioning (J-STD-020, MSL3)

TC @ -40~60'C, 10 cycles => Baking @ 125℃ , 24 hours. => Soaking @ 30℃ / 60% R.H., 192 hours => IR : 3 times.

4. ESD Sensitivity

Test Items	Reference	Test Criteria	Test Results	Pass/ Fail
4.1 Human Body Model (HBM)	HBM: JESD22-A114-B	> ±2000V	> ±3000V	Pass
4.2 Charge Device Model (CDM)	CDM: ANSI/ ESD SP 5.3.2	> ±500V	> ±750V	Pass

4.3 Judgment Criteria : Pass Leakage, standby current and functionality tests at both high and low temperature.

5. Latch-up Test

Test Items	Reference	Test Criteria	Test Results	Pass/ Fail
5.1 I-test (Positive and Negative)	EIA/JESD 78	> ±150mA	> ±200mA	Pass
5.2 V-supply over voltage test	EIA/JESD 78	>± 1.5 max. V_{supply}	>± 1.5 max. V_{supply}	Pass

5.3 Judgment Criteria : Pass Leakage, standby current and functionality tests at both high and low temperature.