

Reliability Qualification Report

for

DDRIII SDRAM with Pb/Halogen Free

(256M×16, 30nm SDRAM AS4C256M16D3B-12BIN)

Index

1. Information	Page 1
2. Life Test	Page 2
3. Environmental Test	Page 3
4. ESD Test	Page 4
5. Latch-up Test	Page 5
6. IR-reflow Profile	Page 6

1. Information

Product	4Gb DDRIII SDRAM
Device	AS4C256M16D3B-12BIN
Technology	30nm
Function	256M*16 DDRIII

Package Type	96B FBGA
Substrate	BT
Solder Ball	Sn-Ag-Cu solder ball
Molding Compound	Hitachi CEL-1702HF
Package Size	9*13.5 mm²

2. Life Test

Test Items	Test Conditions	Sample Size	Stress Hours	Results (Number of failures)
2.1 High Temperature Operation Life Test *	Ta = 125 °C ; VDD =1.5V	231	168hrs 500hrs	0/231 0/231
2.2 Low Temperature Operation Life Test *	Ta = -10 °C ; VDD =1.5V	77	168hrs 500hrs	0/77 0/77

Remark:

*. Preconditioning

- 1) Temp. Cycling (-65C/+150C) 20 cycles
- 2) High temp. storage 125'C baking = 10h
- 3) 30C/ 60%RH 192h moisture soak (JEDEC level3)
- 4) Reflow. 3time (J-STD-020)

3. Environmental Test

Test Items	Test Conditions	Sample Size	Stress Hours	Results (Number of failures)
3.1 High Temperature Storage Life Test *	Ta. = 150°C	77	168hrs 500hrs 1000hrs	0/77 0/77 0/77
3.2 Temperature Cycle Test *	Ta.= -65°C / +150°C	231	200 cycs 500cycs 1000cycs	0/231 0/231 0/231
3.3 Highly Accelerated Temperature and Humidity Stress*	Ta. = 110°C / 85%RH; VDD = 1.6V	231	168hrs 264hrs	0/231 0/231

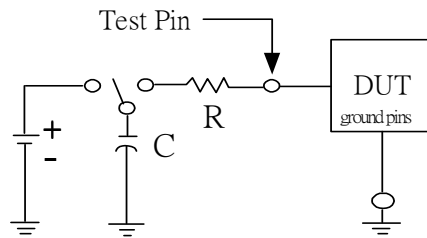
Remark:

*. Preconditioning

- 1) Temp. Cycling (-65C/+150C) 20 cycles
- 2) High temp. storage 125'C baking = 10h
- 3) 30C/ 60%RH 192h moisture soak (JEDEC level3)
- 4) Reflow. 3 time (J-STD-020)

4. ESD Sensitivity

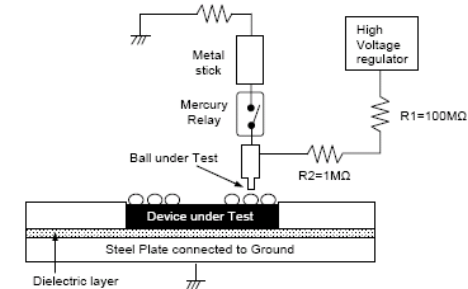
4.1 Human Body Model (HBM) Test Circuit



* Human Body Model (HBM)

- Capacitance : 100 pF, Resistance : 1.5 K Ω
3 pulses per polarity
1 sec interval between pluses
- Sample size : 3ea
- Stress Voltage : > $\pm 2000V$

4.2 Charge Device Model (CDM) test circuit:



- Direct charging method
3 pulses per polarity
1 sec interval between pluses
- Sample size : 3 ea
- Stress Voltage : > $\pm 1000V$ (Corner Balls)
> $\pm 500V$ (All other Balls)

4.2 Reference: HBM: MIL-STD-883 Method 3015.8-2012; CDM: ESD S5.3.1-2009

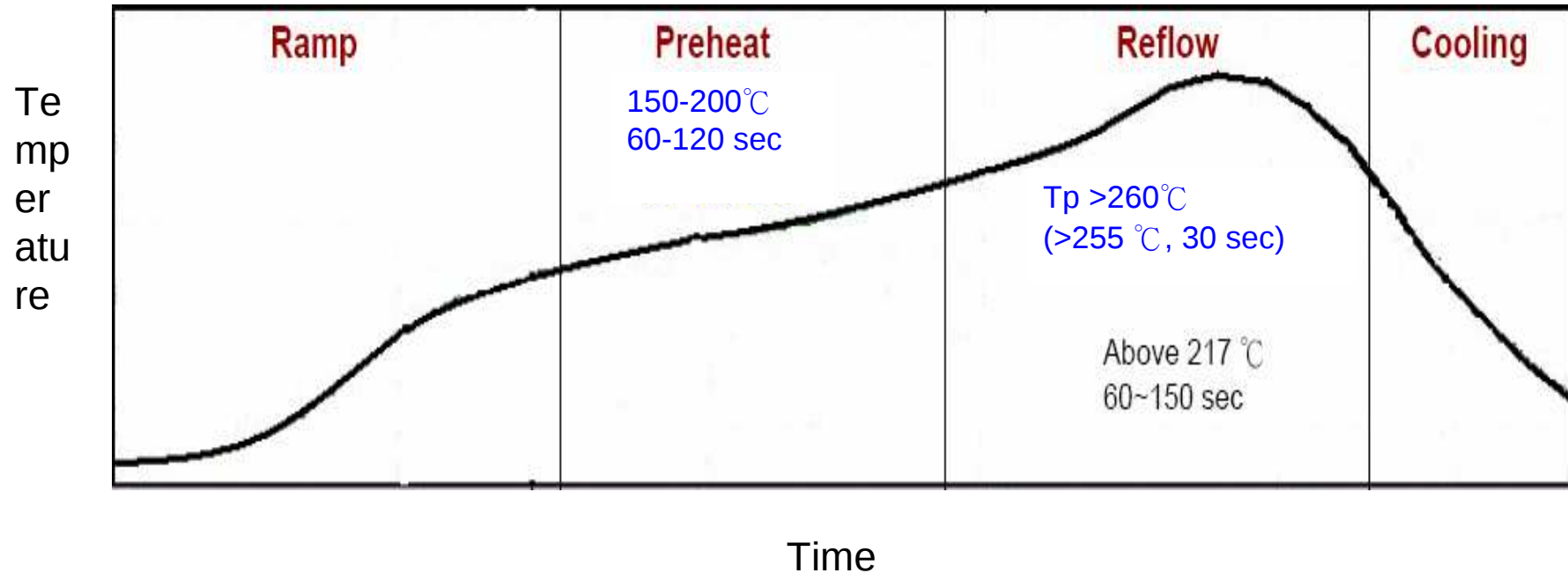
4.3 Test Result : **HBM : > 2000V; CDM : > 1000V (Corner Balls)**
> 500V (All other Balls)

5. Latch-up Test

Test Items	Test Conditions	Sample Size	Results (Number of failures)
5.1 I-test (I/O pin current pulse injection)	$>\pm 200\text{mA}$; $T_c = 95\text{ }^{\circ}\text{C}$	6 ea	0/6
5.2 V-supply over voltage test	$>\pm 2.36\text{V}$; $T_c = 95\text{ }^{\circ}\text{C}$	6 ea	0/6

5.2 Reference: Test procedure in according to EIA/JESD 78, test temp. is Class2 and failure criteria is Level A.

6. IR-reflow Profile



1. The IR reflow profile follows the IPC/JEDEC J-STD-020D.1.
2. Ramp up rate: 3 °C/sec max., Ramp down rate: 6 °C/sec max..
3. The maximum temperature should be limited to 260 °C.
4. Time above liquidus temperature (217 °C) should be 60~150 sec.
5. The re-flow should not be repeated for more than 3 times.
6. Time 25 °C to peak temperature should be 8 minutes maximum.