Automotive AEC-Q100 Grade2 Compliance

Reliability Qualification Report

For

LPDDR4X SDRAM

(25nm,8Gb, x32, BGA200)

A2 Grade （Tc: -40ºC~105ºC）

Part List

Part Number	Density	Org.	Vdd1/Vdd2/Vddq (V)	Package	Speed (MHz)	Temperature
AS4C256M32MD4V-062BAN	8Gb	256MbX32	1.8/1.1/0.6	BGA200 (10 x 14.5mm)	1600	-40°C to 105°C

Contents

1. Information 4

2. Process Reliability 5

3. Accelerated Life Test 6

4. Accelerated Environmental Test 6

5 . ESD Sensitivity 7

6. Latch-Up Immunity 7

Information

Product	**8Gb (256Mx32)**	
Target Quality	A2 Grade (Tc : -40C ~ 105C)	
Die Fabrication	**Wafer Foundry**	PowerChip
	Technology	25nm
	Die Metallization & Levels	Al-Cu, 3 Levels
	Substrate Material	12inches Si Wafer
Package Assembly & Testing	**Package Type**	VFBGA 200B
	Bond Wire	Au
	Mold Compound	9740HF
	Die Attach Materials	EM710
	Solder Ball Materials	SAC305

Reliability Process

Test Items	Reference	Test Conditions	Sample Size	Results
Hot Carrier Injection (HCI)	JESD28 & 60	Ta=25ºC;	15 per lot	AC t0.01%> 10 years; Pass;
Time Dependent Dielectric Breakdown (TDDB)	JESD35	Ta=90ºC;	60 per lot	t0.01%> 10 years; Pass;
Negative Bias Temperature Instability (NBTI)	JESD90	Ta=90ºC;	15 per lot	t0.01%> 10 years; Pass;
Electro migration (EM)	JESD61	Ta=200ºC; M1, M2, M3, 2TH, 3TH;	12 per structure	t0.01%> 10 years; Pass;
Stress Migration	JESD87	Ta=225ºC; M1, M2, M3, 2TH, 3TH;	≥30ea	No Failure @1000hrs ((10% resistance change))

Accelerated Life Test

Product	Stress	Spec	Test Condition	SS	Stress duration	Results
8G(x32)	HTOL	JESD22-A108	Vdd1 = 2.0V Vdd2/q=1.21V Ta = 125C	3 Lot (80pcs/lot)	500hrs 1000hrs	Pass (0 Failures)
	ELFR	AEC-Q100-008	Vdd1=2.1V Vdd2/q=1.45V Ta=125C	3 Lot (800pcs/lot)	48hrs	Pass (0 Failures)

Accelerated Environmental Test

Product	Stress	Spec	Test Condition	SS	Stress duration	Results
8G(x32)	HTS[1]	JESD22-A103	Ta=150C	3 Lots (45pcs/lot)	500hrs 1000hrs	Pass (0 Failures)
	TCT[1]	JESD22-A104	-65C/150C	3 Lots (77pcs/lot)	500x	Pass (0 Failures)
	bHAST[1]	JESD22-A110	130C/85% R.H; Vdd1=1.95V, Vdd2/q=1.17V	3 Lots (77pcs/lot)	96hrs	Pass (0 Failures)

Note.1) Stress tests done after Pre-Conditioning (Bake:150C/24hrs, Soak: 60C/60%RH/40hrs, Reflow:3x260C)

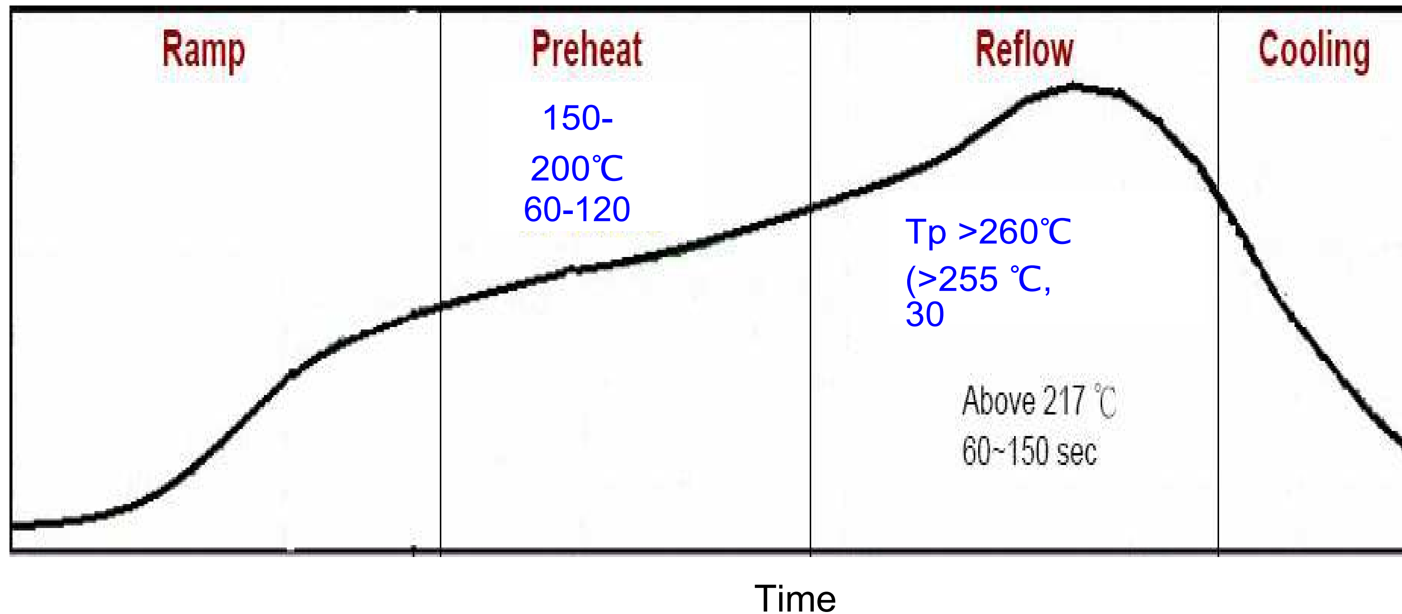
ESD Stress

Product	Test Item	Spec	Test Condition	ESD Voltage	Sample Size	Results
8G(x32)	HBM	AEC-Q100-002D	+/-2000V	+/-2000V	15	Pass (0 Failures)
	CDM	AEC-Q100-011-D	+/-750V	+/-750V	3	Pass (0 Failures)

Latch – Up Stress

Product	Test Item	Spec	Test Condition	Sample Size	Results
8G(x32)	Over Voltage Test	AEC-Q100-004	1.5xVdd_Max; Temperature 125C	3	Pass (0 Failures)
	I-Test		+/-100/200mA Temperature 125C	3	Pass (0 Failures)

Temperature Profile of IR Reflow



1. The IR reflow profile follows the IPC/JEDEC J-STD-020D.1.
2. Ramp up rate: 3 ℃/sec max., Ramp down rate: 6 ℃/sec max..
3. The maximum temperature should be limited to 260 ℃.
4. Time above liquidus temperature (217 ℃) 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.