Product Qualification Report

45nm 512M LPDDR1

Test Item	Test Conditions	Test Results	Sample Size	# of Fail	Criteria
EFR	125℃ / 1.1 * Max Vdd	Pass @ 48Hrs	2300ea	0	Acc/Rej = 1/2
HTOL	125℃ / 1.1 * Max Vdd	Pass @ 504Hrs	231ea	0	Acc/Rej = 1/2

EFR : Early Failure Rate

HTOL : High Temperature Operating Life

Test Item	Test Conditions	Test Results	Sample Size	# of Fail	Criteria
HTS	150℃	Pass @ 1008Hrs	75ea	0	Acc/Rej = 0/1
LTS	-50℃	Pass @ 1008Hrs	75ea	0	Acc/Rej = 0/1
TCT (*)	-50℃ / 125℃	Pass @ 1000Cycles	75ea	0	Acc/Rej = 0/1
PCT (*)	121℃ / 100%RH / 2ATM	Pass @ 168Hrs	75ea	0	Acc/Rej = 0/1
T/H (*)	85℃/ 85%RH	Pass @ 504Hrs	75ea	0	Acc/Rej = 0/1
MSL	30℃ / 60%	Pass @ 192hrs	45ea	0	Acc/Rej = 0/1

☞ Note(*) : Pre-Conditioning should be performed before THB, T/C and PCT

Test Item	Test Conditions	Sample Size	Test Result		Spec	Criteria
Electrostatic Discharge	JESD22-A114	9ea	HBM : ±2000V	PASS	> 2000V	Acc/Rej = 0/1
	JESD22-A115	9ea	MM : ±200V	PASS	> 200V	
	JESD22-C101	3ea	CDM : 1000V	PASS	> 1000V	
Latch-up	JESD 78	9ea	Power : > 3V	PASS	> 200mA	
			Current Injection : ±200mA	PASS		

Test Item	Condition	Duration	S/S	Ea	β	Result	Remark
EFR	125℃ / 1.1 * Max Vdd	48 hrs	2300ea	0.5	6.9	93.0 FIT	60% confidence Level
HTOL	125℃ / 1.1 * Max Vdd	504 hrs	231ea			88.2 FIT	

The method of determining a product's failure rate is through the use of accelerated high temperature operation life tests. performed.

1) Temperature Acceleration is determined by TAF = exp[(Ea/k x 1/Tu-1/Ts)]
K is Boltzmann's constant(8617e-5 ev/K, Ea is the activation energy in eV

2) Voltage Acceleration is described by VAF = exp[B x (Vs – Vu)]
B is the voltage acceleration term in 1/V.

3) Acceleration Factor = TAF(t) * AF
Long time Failure Rate (1~10 years) for 1 technology is gauged by a Failure In Time (FIT) calculation based on accelerated stress data.
The units for FIT are failures per Billion device hours.

4) Mean Time To Failure (MTTF) = (1/FITs) x 10e9 @ 60% confidence level.