Quality and Reliability Report (Quarterly)

Oct., 2021

Process Related Reliability Test Data

Early Life Failure Rate (ELFR)

1. Test Condition

Performed to accelerate infant mortality failure mechanisms within 1~3 years

Spec: Failure Rate < 300 ppm, Confidence Level: 60%

2. Dynamic RAM Products

Design Rule Technology	Period	Sample Size	No. of Failure/Failure Mode				Failure Rate (ppm)
			Total	Function	DC	Pause	
0.025μm CMOS/SPTM	Q4,20	13764	0	0	0	0	67
	Q1,21	10208	0	0	0	0	90
	Q2,21	13541	0	0	0	0	68
	Q3,21	12996	0	0	0	0	71
0.038μm CMOS/SPTM	Q4,20	13579	0	0	0	0	67
	Q1,21	10910	0	0	0	0	84
	Q2,21	11170	0	0	0	0	82
	Q3,21	9447	0	0	0	0	97
0.046μm CMOS/SPTM	Q4,20	16720	0	0	0	0	55
	Q1,21	10032	0	0	0	0	91
	Q2,21	10032	0	0	0	0	91
	Q3,21	10032	0	0	0	0	91

3. Non-Volatile Memory Products

Design Rule Technology	Period	Sample Size	No. of Failure/Failure Mode				Failure Rate (ppm)
			Total	Function	DC	DR	
0.046 µm CMOS/DPDM 3V/1.8V NAND	Q4,20	6300	0	0	0	0	145
	Q1,21	6300	0	0	0	0	145
	Q2,21	9450	0	0	0	0	97
	Q3,21	9450	0	0	0	0	97
0.058 µm CMOS/DPTM 3V Serial Flash	Q4,20	7350	0	0	0	0	125
	Q1,21	7350	0	0	0	0	125
	Q2,21	9450	0	0	0	0	97
	Q3,21	6300	0	0	0	0	145
0.058 µm CMOS/DPTM 1.8V Serial Flash	Q4,20	6300	0	0	0	0	145
	Q1,21	6300	0	0	0	0	145
	Q2,21	6300	0	0	0	0	145
	Q3,21	9450	0	0	0	0	97
0.09 µm CMOS/DPTM 3V/1.8V serial Flash	Q4,20	3150	0	0	0	0	290
	Q1,21	3150	0	0	0	0	290
	Q2,21	3150	0	0	0	0	290
	Q3,21	3150	0	0	0	0	290

High-Temperature Operating Life Test (HTOL)

1. Test Condition

Condition: Dynamic operating condition with Vcc = 3.6V/2.7V/1.9V/1.575V for 3.3V/2.5V/1.8V/1.5V products,T=125°C,f=1.0MHz/1.25MHz/1.25MHz/1.25MHz for synchronous SDRAMs/DDR/ DDRII/DDRIII

Dynamic operating read condition with Vcc = 3.6V/1.95V for 3.3V/1.8V products, T = 125°C, f = 1 MHz for Nov-Volatile Memory

Duration: Test time points at 500 hrs, and 1000 hrs.

2. Dynamic RAM Products

2.1 By Device Type

Product Type	Part No.	Design Rule	Period	No. of Samples	No. of Fails	Reject Information
128M × 16 1.575V	W632GG6NB	0.025 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	
128M × 16 1.575V	W632GG6MB	0.038 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	
64M × 16 1.9V	W9751GG6ST	0.046 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	

2.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.025 µm CMOS/SPTM	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.038 µm CMOS/SPTM	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.046 µm CMOS/SPTM	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	

3. Non-Volatile Memory Products

3.1 By Device Type

Product Type	Part No.	Design Rule	Period	No. of Samples	No. of Fails	Reject Information
4G, 3V NAND FLASH	W29N04GV	0.046 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	-	-	
			Q3,21	-	-	
2G, 1.8V NAND FLASH	W29N02GZ	0.046 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	77	0	
			Q3,21	-	-	
2G, 3V NAND FLASH	W29N02GV	0.046 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	77	0	
1G, 3V SPI NAND FLASH	W25N01GV	0.046 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	
64M, 3V SERIAL FLASH	W25Q64JV	0.058 µm	Q4,20	77	0	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	-	-	
32M, 3V SERIAL FLASH	W25Q32JV	0.058 µm	Q4,20	-	-	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	-	-	
16M, 3V SERIAL FLASH	W25Q32JV	0.058 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	-	-	

256M,1.8V SERIAL FLASH	W25Q256JW	0.058 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	
8M, 3V SERIAL FLASH	W25Q80DV	0.09 um	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	

3.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.046 µm CMOS/DPDM 3V/1.8V NAND Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.046 µm CMOS/DPDM 3V/1.8V SPI NAND Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.058 µm CMOS/DPTM 3V Serial Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.058 µm CMOS/DPTM 1.8V Serial Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.09 µm CMOS/DPTM 3V Serial Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	

High-Temperature Storage Life Test (HTSL)

1. Test Condition

Condition: T = 150°C

Duration: Test time points at 500 hrs, and 1000 hrs. (Need to do precondition)

2. Dynamic RAM Products

2.1 By Device Type

Product Type	Part No.	Design Rule	Period	No. of Samples	No. of Fails	Reject Information
128M × 16 1.575V	W632GG6NB	0.025 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	
128M × 16 1.575V	W632GG6MB	0.038 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	
64M × 16 1.9V	W9751GG6ST	0.046 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	

2.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.025 µm CMOS/SPTM	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.038 µm CMOS/SPTM	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.046 µm CMOS/SPTM	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	

3. Non-Volatile Memory Products

3.1 By Device Type

Product Type	Part No.	Design Rule	Period	No. of Samples	No. of Fails	Reject Information
4G, 3V NAND FLASH	W29N04GV	0.046 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	-	-	
			Q3,21	-	-	
2G, 1.8V NAND FLASH	W29N02GZ	0.046 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	77	0	
			Q3,21	-	-	
2G, 3V NAND FLASH	W29N02GV	0.046 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	77	0	
1G, 3V SPI NAND FLASH	W25N01GV	0.046 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	
64M, 3V SERIAL FLASH	W25Q64JV	0.058 µm	Q4,20	77	0	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	-	-	
32M, 3V SERIAL FLASH	W25Q32JV	0.058 µm	Q4,20	-	-	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	-	-	
16M, 3V SERIAL FLASH	W25Q32JV	0.058 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	77	0	

256M,1.8V SERIAL FLASH	W25Q256JW	0.058 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	
8M, 3V SERIAL FLASH	W25Q80DV	0.09 um	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	

3.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.046 µm CMOS/DPDM 3V/1.8V NAND Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.046 µm CMOS/DPDM 3V/1.8V SPI NAND Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.058 µm CMOS/DPTM 3V Serial Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.058 µm CMOS/DPTM 1.8V Serial Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.09 µm CMOS/DPTM 3V Serial Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	

Data Retention Test (DR)

1. Test Condition

Condition: T = 150°C

Duration: Test time points at 500 hrs, and 1000 hrs.

2. Non-Volatile Memory Products

2.1 By Device Type

Product Type	Part No.	Design Rule	Period	No. of Samples	No. of Fails	Reject Information
4G, 3V NAND FLASH	W29N04GV	0.046 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	-	-	
			Q3,21	-	-	
2G, 1.8V NAND FLASH	W29N02GZ	0.046 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	77	0	
			Q3,21	-	-	
2G, 3V NAND FLASH	W29N02GV	0.046 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	77	0	
1G, 3V SPI NAND FLASH	W25N01GV	0.046 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	
64M, 3V SERIAL FLASH	W25Q64JV	0.058 µm	Q4,20	77	0	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	-	-	
32M, 3V SERIAL FLASH	W25Q32JV	0.058 µm	Q4,20	-	-	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	-	-	

16M, 3V SERIAL FLASH	W25Q32JV	0.058 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	77	0	
256M,1.8V SERIAL FLASH	W25Q256JW	0.058 µm	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	
8M, 3V SERIAL FLASH	W25Q80DV	0.09 um	Q4,20	77	0	
			Q1,21	77	0	
			Q2,21	77	0	
			Q3,21	77	0	

2.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.046 µm CMOS/DPDM 3V/1.8V NAND Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.046 µm CMOS/DPDM 3V/1.8V SPI NAND Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.046 µm CMOS/DPDM 1.8V SPI NAND Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.058 µm CMOS/DPTM 3V Serial Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	

0.058 μm CMOS/DPTM 1.8V Serial Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	
0.09 μm CMOS/DPTM 3V Serial Flash	Q4,20	77	0	
	Q1,21	77	0	
	Q2,21	77	0	
	Q3,21	77	0	

Endurance Cycling With Data Retention Test

Room Temperature cycling with DR

1. Test Condition

Condition: T = Room temperature, Vcc = 3.6V/1.95V for Endurance Cycling test, and
T = Room temperature ,Vcc = 3.6V/1.95V , f = 10 MHz for room temperature operation life test
Duration: 1K, 10K, 100K cycles for Endurance Cycling test and 500 hrs for room temperature operation life test

2. Non-Volatile Memory Products

2.1 By Device Type

Product Type	Part No.	Design Rule	Period	No. of Samples	No. of Fails	Reject Information
4G, 3V NAND FLASH	W29N04GV	0.046 µm	Q4,20	38	0	
			Q1,21	38	0	
			Q2,21	-	-	
			Q3,21	-	-	
2G, 1.8V NAND FLASH	W29N02GZ	0.046 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	38	0	
			Q3,21	-	-	
2G, 3V NAND FLASH	W29N02GV	0.046 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	38	0	
1G, 3V SPI NAND FLASH	W25N01GV	0.046 µm	Q4,20	38	0	
			Q1,21	38	0	
			Q2,21	38	0	
			Q3,21	38	0	
64M, 3V SERIAL FLASH	W25Q64JV	0.058 µm	Q4,20	38	0	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	-	-	
32M, 3V SERIAL FLASH	W25Q32JV	0.058 µm	Q4,20	-	-	
			Q1,21	38	0	
			Q2,21	38	0	
			Q3,21	-	-	
32M, 3V SERIAL FLASH	W25Q32JV	0.058 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	38	0	

256M,1.8V SERIAL FLASH	W25Q256JW	0.058 μm	Q4,20	38	0	
			Q1,21	38	0	
			Q2,21	38	0	
			Q3,21	38	0	
8M, 3V SERIAL FLASH	W25Q80DV	0.09 μm	Q4,20	38	0	
			Q1,21	38	0	
			Q2,21	38	0	
			Q3,21	38	0	

2.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.046 µm CMOS/DPDM 3V/1.8V NAND Flash	Q4,20	38	0	
	Q1,21	38	0	
	Q2,21	38	0	
	Q3,21	38	0	
0.046 µm CMOS/DPDM 3V/1.8V SPI NAND Flash	Q4,20	38	0	
	Q1,21	38	0	
	Q2,21	38	0	
	Q3,21	38	0	
0.058 µm CMOS/DPTM 3V Serial Flash	Q4,20	38	0	
	Q1,21	38	0	
	Q2,21	38	0	
	Q3,21	38	0	
0.058 µm CMOS/DPTM 1.8V Serial Flash	Q4,20	38	0	
	Q1,21	38	0	
	Q2,21	38	0	
	Q3,21	38	0	
0.09 µm CMOS/DPTM 3V Serial Flash	Q4,20	38	0	
	Q1,21	38	0	
	Q2,21	38	0	
	Q3,21	38	0	

High Temperature cycling with DR

1. Test Condition

Condition: T = 85°C, Vcc = 3.6V/1.95V for Endurance Cycling test, and T = 125°C for High Temperature Data Retention test

Duration:

NOR flash:

1K, 10K, 100K cycles for Endurance Cycling test and 100 hrs of High Temperature Data Retention test for 1K, 10K, 100K cycling region

NAND flash:

1K, 10K, 100K cycles for Endurance Cycling test and 100 hrs of High Temperature Data Retention test for 1K,10K cycling region

2. Non-Volatile Memory Products

2.1 By Device Type

Product Type	Part No.	Design Rule	Period	No. of Samples	No. of Fails	Reject Information
4G, 3V NAND FLASH	W29N04GV	0.046 µm	Q4,20	39	0	
			Q1,21	39	0	
			Q2,21	-	-	
			Q3,21	-	-	
2G, 1.8V NAND FLASH	W29N02GZ	0.046 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	39	0	
			Q3,21	-	-	
2G, 3V NAND FLASH	W29N02GV	0.046 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	39	0	
1G, 3V SPI NAND FLASH	W25N01GV	0.046 µm	Q4,20	39	0	
			Q1,21	39	0	
			Q2,21	39	0	
			Q3,21	39	0	
64M, 3V SERIAL FLASH	W25Q64JV	0.058 µm	Q4,20	39	0	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	-	-	

32M, 3V SERIAL FLASH	W25Q32JV	0.058 µm	Q4,20	-	-	
			Q1,21	39	0	
			Q2,21	39	0	
			Q3,21	-	-	
32M, 3V SERIAL FLASH	W25Q16JV	0.058 µm	Q4,20	-	-	
			Q1,21	-	-	
			Q2,21	-	-	
			Q3,21	39	0	
256M,1.8V SERIAL FLASH	W25Q256JW	0.058 µm	Q4,20	39	0	
			Q1,21	39	0	
			Q2,21	39	0	
			Q3,21	39	0	
8M, 3V SERIAL FLASH	W25Q80DV	0.09 µm	Q4,20	39	0	
			Q1,21	39	0	
			Q2,21	39	0	
			Q3,21	39	0	

2.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.046 µm CMOS/DPDM 3V/1.8V NAND Flash	Q4,20	39	0	
	Q1,21	39	0	
	Q2,21	39	0	
	Q3,21	39	0	
0.046 µm CMOS/DPDM 3V/1.8V SPI NAND Flash	Q4,20	78	0	
	Q1,21	39	0	
	Q2,21	39	0	
	Q3,21	39	0	
0.046 µm CMOS/DPDM 1.8V NAND Flash	Q4,20	39	0	
	Q1,21	39	0	
	Q2,21	39	0	
	Q3,21	39	0	
0.058 µm CMOS/DPTM 3V Serial Flash	Q4,20	39	0	
	Q1,21	39	0	
	Q2,21	39	0	
	Q3,21	39	0	
0.058 µm CMOS/DPTM 1.8V Serial Flash	Q4,20	39	0	
	Q1,21	39	0	
	Q2,21	39	0	
	Q3,21	39	0	
0.09 µm CMOS/DPTM 3V Serial Flash	Q4,20	39	0	
	Q1,21	39	0	
	Q2,21	39	0	
	Q3,21	39	0	

Electrostatic Discharge (ESD) Test

1.1 Test Condition

Human Body Mode.

According to JS-001

1.2 Dynamic RAM Products

Product Type	Design Rule (μm)	No. of DUT	Pass Voltage (HBM)
64M x 16 (1.5 V)	0.046	12	> 2 kV
128M x 16 (1.5 V)	0.046	12	> 2 kV
32M x 16 (1.9 V)	0.046	12	> 2 kV
16M x 16 (1.9 V)	0.046	12	> 2 kV
8M x 16 (1.9 V)	0.046	12	> 2 kV
32M x 32 (1.9 V)	0.046	12	> 2 kV
16M x 32 (1.9 V, LP)	0.046	12	> 2 kV
32M x 32 (1.9 V, LP)	0.046	12	> 2 kV
8M x 32 (1.95 V, LP)	0.046	12	> 2 kV
16M x 32 (1.95 V, LP)	0.046	12	> 2 kV
32M x 32 (1.95 V, LP)	0.046	12	> 2 kV
64M x 32 (1.95 V, LP)	0.046	12	> 2 kV
64M x 16 (1.9 V)	0.046	12	> 2 kV
4M x 16 (2.7 V)	0.046	12	> 2 kV
8M x 16 (2.7 V)	0.046	12	> 2 kV
4M x 16 (1.98 V)	0.046	12	> 2 kV
128M x 16 (1.575 V)	0.038	12	> 2 kV
128M x 16 (1.575 V)	0.025	12	> 2 kV

1.3 Non-Volatile Memory Products

Product Type	Design Rule (μm)	No. of DUT	Pass Voltage (HBM)
4G NAND FLASH(3V)	0.046	12	> 2 kV
2G NAND FLASH(3V)	0.046	12	> 2 kV
1G NAND FLASH(3V)	0.046	12	> 2 kV
1G SPI NAND FLASH(3V)	0.046	12	> 2 kV
2G NAND FLASH(1.8V)	0.046	12	> 2 kV
1G NAND FLASH(1.8V)	0.046	12	> 2 kV
1G SPI NAND FLASH(1.8V)	0.046	12	> 2 kV
256M SERIAL FLASH (3V)	0.058	12	> 2 kV
128M SERIAL FLASH (3V)	0.058	12	> 2 kV
64M SERIAL FLASH (3V)	0.058	12	> 2 kV
32M SERIAL FLASH (3V)	0.058	12	> 2 kV
128M SERIAL FLASH(1.8V)	0.058	12	> 2 kV
64M SERIAL FLASH (1.8V)	0.058	12	> 2 kV
32M SERIAL FLASH (1.8V)	0.058	12	> 2 kV
4M SERIAL FLASH (3V)	0.09	12	> 2 kV
8M SERIAL FLASH (3V)	0.09	12	> 2 kV
16M SERIAL FLASH (3V)	0.09	12	> 2 kV
32M SERIAL FLASH (3V)	0.09	12	> 2 kV
64M SERIAL FLASH (3V)	0.09	12	> 2 kV
128M SERIAL FLASH (3V)	0.09	12	> 2 kV
4M SERIAL FLASH (1.8V)	0.09	12	> 2 kV
8M SERIAL FLASH (1.8V)	0.09	12	> 2 kV
16M SERIAL FLASH(1.8V)	0.09	12	> 2 kV
32M SERIAL FLASH(1.8V)	0.09	12	> 2 kV
64M SERIAL FLASH(1.8V)	0.09	12	> 2 kV
32M Parallel FLASH(3V)	0.09	12	> 2 kV
64M Parallel FLASH(3V)	0.09	12	> 2 kV
128M Parallel FLASH(3V)	0.09	12	> 2 kV

2.1 Test Condition

Charged Device Mode.

According to JS-002

2.2 Dynamic RAM Products

Product Type	Design Rule (μm)	No. of DUT	Pass Voltage (CDM)
64M x 16 (1.5 V)	0.046	12	> 750V
128M x 16 (1.5 V)	0.046	12	> 750V
32M x 16 (1.9 V)	0.046	12	> 750V
16M x 16 (1.9 V)	0.046	12	> 750V
8M x 16 (1.9 V)	0.046	12	> 750V
32M x 32 (1.9 V)	0.046	12	> 750V
16M x 32 (1.9 V, LP)	0.046	12	> 750V
32M x 32 (1.9 V, LP)	0.046	12	> 750V
8M x 32 (1.95 V, LP)	0.046	12	> 750V
16M x 32 (1.95 V, LP)	0.046	12	> 750V
32M x 32 (1.95 V, LP)	0.046	12	> 750V
64M x 32 (1.95 V, LP)	0.046	12	> 750V
64M x 16 (1.9 V)	0.046	12	> 750V
4M x 16 (2.7 V)	0.046	12	> 750V
8M x 16 (2.7 V)	0.046	12	> 750V
4M x 16 (1.98 V)	0.046	12	> 750V
128M x 16 (1.575 V)	0.038	12	> 750V
128M x 16 (1.575 V)	0.025	12	> 750V

2.3 Non-Volatile Memory Products

Product Type	Design Rule (μm)	No. of DUT	Pass Voltage (CDM)
4G NAND FLASH(3V)	0.046	12	> 750V
2G NAND FLASH(3V)	0.046	12	> 750V
1G NAND FLASH(3V)	0.046	12	> 750V
1G SPI NAND FLASH(3V)	0.046	12	> 750V
2G NAND FLASH(1.8V)	0.046	12	> 750V
1G NAND FLASH(1.8V)	0.046	12	> 750V
1G SPI NAND FLASH(1.8V)	0.046	12	> 750V
256M SERIAL FLASH (3V)	0.058	12	> 750V
128M SERIAL FLASH (3V)	0.058	12	> 750V
64M SERIAL FLASH (3V)	0.058	12	> 750V
32M SERIAL FLASH (3V)	0.058	12	> 750V
128M SERIAL FLASH(1.8V)	0.058	12	> 750V
64M SERIAL FLASH (1.8V)	0.058	12	> 750V
32M SERIAL FLASH (1.8V)	0.058	12	> 750V
4M SERIAL FLASH (3V)	0.09	12	> 750V
8M SERIAL FLASH (3V)	0.09	12	> 750V
16M SERIAL FLASH (3V)	0.09	12	> 750V
32M SERIAL FLASH (3V)	0.09	12	> 750V
64M SERIAL FLASH (3V)	0.09	12	> 750V
128M SERIAL FLASH (3V)	0.09	12	> 750V
4M SERIAL FLASH (1.8V)	0.09	12	> 750V
8M SERIAL FLASH (1.8V)	0.09	12	> 750V
16M SERIAL FLASH(1.8V)	0.09	12	> 750V
32M SERIAL FLASH(1.8V)	0.09	12	> 750V
64M SERIAL FLASH(1.8V)	0.09	12	> 750V
32M Parallel FLASH(3V)	0.09	12	> 750V
64M Parallel FLASH(3V)	0.09	12	> 750V
128M Parallel FLASH(3V)	0.09	12	> 750V

Latch-Up Test

1. Test Condition

According to JEDEC -78.

2. Dynamic RAM Products

Product Type	Design Rule (μm)	No. of DUT	Pass Current
64M x 16 (1.5 V)	0.046	6	>200 mA
128M x 16 (1.5 V)	0.046	6	>200 mA
32M x 16 (1.9 V)	0.046	6	>200 mA
16M x 16 (1.9 V)	0.046	6	>200 mA
8M x 16 (1.9 V)	0.046	6	>200 mA
32M x 32 (1.9 V)	0.046	6	>200 mA
16M x 32 (1.9 V, LP)	0.046	6	>200 mA
32M x 32 (1.9 V, LP)	0.046	6	>200 mA
8M x 32 (1.95 V, LP)	0.046	6	>200 mA
16M x 32 (1.95 V, LP)	0.046	6	>200 mA
32M x 32 (1.95 V, LP)	0.046	6	>200 mA
64M x 32 (1.95 V, LP)	0.046	6	>200 mA
64M x 16 (1.9 V)	0.046	6	>200 mA
4M x 16 (2.7 V)	0.046	6	>200 mA
8M x 16 (2.7 V)	0.046	6	>200 mA
4M x 16 (1.98 V)	0.046	6	>200 mA
128M x 16 (1.575 V)	0.038	6	>200 mA
128M x 16 (1.575 V)	0.025	6	>200 mA

3. Non-Volatile Memory Products

Product Type	Design Rule (μm)	No. of DUT	Pass Voltage
4G NAND FLASH (3V)	0.046	6	> 200 mA
2G NAND FLASH (3V)	0.046	6	> 200 mA
1G NAND FLASH (3V)	0.046	6	> 200 mA
1G SPI NAND FLASH (3V)	0.046	6	> 200 mA
2G NAND FLASH (1.8V)	0.046	6	> 200 mA
1G NAND FLASH (1.8V)	0.046	6	> 200 mA
1G SPI NAND FLASH (1.8V)	0.046	6	> 200 mA
256M SERIAL FLASH (3V)	0.058	6	> 200 mA
128M SERIAL FLASH (3V)	0.058	6	> 200 mA
64M SERIAL FLASH (3V)	0.058	6	> 200 mA
32M SERIAL FLASH (3V)	0.058	6	> 200 mA
128M SERIAL (FLASH(1.8V)	0.058	6	> 200 mA
64M SERIAL FLASH (1.8V)	0.058	6	> 200 mA
32M SERIAL FLASH (1.8V)	0.058	6	> 200 mA
4M SERIAL FLASH (3V)	0.09	6	> 200 mA
8M SERIAL FLASH (3V)	0.09	6	> 200 mA
16M SERIAL FLASH (3V)	0.09	6	> 200 mA
32M SERIAL FLASH (3V)	0.09	6	> 200 mA
64M SERIAL FLASH (3V)	0.09	6	> 200 mA
128M SERIAL FLASH (3V)	0.09	6	> 200 mA
4M SERIAL FLASH (1.8V)	0.09	6	>200 mA
8M SERIAL FLASH (1.8V)	0.09	6	> 200 mA
16M SERIAL FLASH(1.8V)	0.09	6	> 200 mA
32M SERIAL FLASH(1.8V)	0.09	6	> 200 mA
64M SERIAL FLASH(1.8V)	0.09	6	> 200 mA
32M Parallel FLASH (3V)	0.09	6	> 200 mA
64M Parallel FLASH (3V)	0.09	6	> 200 mA
128M Parallel FLASH (3V)	0.09	6	> 200 mA