



6. Process Related Reliability Test Data

Dynamic Early Fail Rate (EFR)

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	
0.038μm CMOS/SPTM	Q3,18	8138	0	0	0	0	113
	Q4,18	7722	0	0	0	0	119
	Q1,19	6782	0	0	0	0	135
	Q2,19	9801	0	0	0	0	93
0.046μm CMOS/SPTM	Q3,18	13376	0	0	0	0	69
	Q4,18	13376	0	0	0	0	69
	Q1,19	13376	0	0	0	0	69
	Q2,19	13376	0	0	0	0	69

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 NAND Flash	Q3,18	6000	0	0	0	0	152
	Q4,18	6000	0	0	0	0	152
	Q1,19	6000	0	0	0	0	152
	Q2,19	6000	0	0	0	0	152
0.046 μm CMOS/DPDM 1.8V NAND Flash	Q3,18	5000	0	0	0	0	183
	Q4,18	6000	0	0	0	0	152
	Q1,19	6000	0	0	0	0	152
	Q2,19	6000	0	0	0	0	152



Quality and Reliability Report

0.058 μ m CMOS/DPTM 3V Serial Flash	Q3,18	13000	0	0	0	0	71
	Q4,18	12000	0	0	0	0	76
	Q1,19	14000	0	0	0	0	65
	Q2,19	12000	0	0	0	0	76
0.058 μ m CMOS/DPTM 1.8V Serial Flash	Q3,18	4000	0	0	0	0	229
	Q4,18	6000	0	0	0	0	152
	Q1,19	6000	0	0	0	0	152
	Q2,19	6000	0	0	0	0	152
0.09 μ m CMOS/DPTM 3V Serial Flash	Q3,18	9000	0	0	0	0	102
	Q4,18	6000	0	0	0	0	152
	Q1,19	6000	0	0	0	0	152
	Q2,19	6000	0	0	0	0	152
0.09 μ m CMOS/DPTM 1.8V Serial Flash	Q3,18	4000	0	0	0	0	229
	Q4,18	4000	0	0	0	0	229
	Q1,19	4000	0	0	0	0	229
	Q2,19	6000	0	0	0	0	152



High-Temperature Operating Life Test (HTOL)

1. Test Condition

Condition: Dynamic operating condition with $V_{cc} = 3.6V/2.7V/1.9V/1.575V$ for $3.3V/2.5V/1.8V/1.5V$ products, $T=125^{\circ}C$, $f=1.0MHz/1.25MHz/1.25MHz/1.25MHz$ for synchronous SDRAMs/DDR/DDRII/DDRIII

Dynamic operating condition with $V_{cc} = 3.6V/1.95V$ for $3.3V/1.8V$ products, $T = 125^{\circ}C$, $f = 1$ 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	W632GG6MB	0.038 μm	Q3,18	231	0	
			Q4,18	231	0	
			Q1,19	231	0	
			Q2,19	231	0	
32M × 16 1.9V	W9751G6KB	0.046 μm	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	



2.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.038 μm CMOS/SPTM	Q3,18	231	0	
	Q4,18	231	0	
	Q1,19	231	0	
	Q2,19	231	0	
0.046 μm CMOS/SPTM	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	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	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	-	-	
2G, 3V NAND FLASH	W29N02GV	0.046 µm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	-	-	
			Q2,19	77	0	
1G, 3V SPI NAND FLASH	W25N01GV	0.046 µm	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	-	-	
			Q2,19	-	-	
512M, 3V SPI NAND FLASH	W25N512GV	0.046 µm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	77	0	
			Q2,19	77	0	
1G, 1.8V SPI NAND FLASH	W25N01GW	0.046 µm	Q3,18	231	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
1G, 1.8V NAND FLASH	W29N01HZ	0.046 µm	Q3,18	231	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
64M, 3V SERIAL FLASH	W25Q16JV	0.058 µm	Q3,18	231	0	
			Q4,18	-	-	
			Q1,19	-	-	
			Q2,19	-	-	



Quality and Reliability Report

64M, 3V SERIAL FLASH	W25Q64JV	0.058 μm	Q3,18	-	-	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
64M, 1.8V SERIAL FLASH	W25Q64FW	0.058 μm	Q3,18	231	0	
			Q4,18	77	0	
			Q1,19	-	-	
			Q2,19	-	-	
256M,1.8V SERIAL FLASH	W25Q256JW	0.058 μm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	77	0	
			Q2,19	77	0	
8M, 3V SERIAL FLASH	W25Q80DV	0.09 um	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
16M, 1.8V SERIAL FLASH	W25Q80EW	0.09 μm	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	



3.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.046 μm CMOS/DPDM 3V NAND Flash	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.046 μm CMOS/DPDM 3V SPI NAND Flash	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.046 μm CMOS/DPDM 1.8V SPI NAND Flash	Q3,18	77	0	
	Q4,18	231	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.046 μm CMOS/DPDM 1.8V NAND Flash	Q3,18	77	0	
	Q4,18	231	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.058 μm CMOS/DPTM 3V Serial Flash	Q3,18	154	0	
	Q4,18	231	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.058 μm CMOS/DPTM 1.8V Serial Flash	Q3,18	77	0	
	Q4,18	231	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.09 μm CMOS/DPTM 3V Serial Flash	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.09 μm CMOS/DPTM 1.8V Serial Flash	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	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	W632GG6MB	0.038 μm	Q3,18	231	0	
			Q4,18	231	0	
			Q1,19	231	0	
			Q2,19	231	0	
32M × 16 1.9V	W951G6KB	0.046 μm	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	



2.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.038 μm CMOS/SPTM	Q3,18	231	0	
	Q4,18	231	0	
	Q1,19	231	0	
	Q2,19	231	0	
0.046 μm CMOS/SPTM	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.065 μm CMOS/SPTM	Q3,18	231	0	
	Q4,18	231	0	
	Q1,19	231	0	
	Q2,19	231	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	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
2G, 3V NAND FLASH	W29N02GV	0.046 μm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	-	-	
			Q2,19	77	0	
1G, 3V SPI NAND FLASH	W25N01GV	0.046 μm	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	-	-	
			Q2,19	-	-	
512M, 3V SPI NAND FLASH	W25N512GV	0.046 μm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	77	0	
			Q2,19	77	0	
1G, 1.8V SPI NAND FLASH	W25N01GW	0.046 μm	Q3,18	231	0	
			Q4,18	77	0	
			Q1,19	-	-	
			Q2,19	-	-	
1G, 1.8V NAND FLASH	W29N01HZ	0.046 μm	Q3,18	231	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
16 M, 3V SERIAL FLASH	W25Q16JV	0.058 μm	Q3,18	231	0	
			Q4,18	-	-	
			Q1,19	-	-	
			Q2,19	-	-	



Quality and Reliability Report

64 M, 3V SERIAL FLASH	W25Q64JV	0.058 μm	Q3,18	-	-	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
256M,1.8V SERIAL FLASH	W25Q256JW	0.058 μm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	77	0	
			Q2,19	77	0	
64M, 1.8V SERIAL FLASH	W25Q64FW	0.058 μm	Q3,18	231	0	
			Q4,18	77	0	
			Q1,19	-	-	
			Q2,19	-	-	
8 M, 3V SERIAL FLASH	W25Q80DV	0.09 um	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
8 M 1.8V SERIAL FLASH	W25Q80EW	0.09 μm	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	



3.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.046 μm CMOS/DPDM 3V NAND Flash	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.046 μm CMOS/DPDM 3V SPI NAND Flash	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.046 μm CMOS/DPDM 1.8V SPI NAND Flash	Q3,18	231	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.046 μm CMOS/DPDM 1.8V NAND Flash	Q3,18	231	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.058 μm CMOS/DPTM 3V Serial Flash	Q3,18	231	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.058 μm CMOS/DPTM 1.8V Serial Flash	Q3,18	231	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.09 μm CMOS/DPTM 3V Serial Flash	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.09 μm CMOS/DPTM 1.8V Serial Flash	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	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	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
2G, 3V NAND FLASH	W29N02GV	0.046 μm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	-	-	
			Q2,19	77	0	
1G, 3V SPI NAND FLASH	W25N01GV	0.046 μm	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	-	-	
			Q2,19	-	-	
512M, 3V SPI NAND FLASH	W25N512GV	0.046 μm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	77	0	
			Q2,19	77	0	
1G, 1.8V SPI NAND FLASH	W25N01GW	0.046 μm	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
1G, 1.8V NAND FLASH	W29N01GW	0.046 μm	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	



16M, 3V SERIAL FLASH	W25Q16JV	0.058 μm	Q3,18	231	0	
			Q4,18	-	-	
			Q1,19	-	-	
			Q2,19	-	-	
64M, 3V SERIAL FLASH	W25Q64JV	0.058 μm	Q3,18	-	-	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
256M, 1.8V SERIAL FLASH	W25Q256JV	0.058 μm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	77	0	
			Q2,19	77	0	
64M, 1.8V SERIAL FLASH	W25Q64FW	0.058 μm	Q3,18	231	0	
			Q4,18	77	0	
			Q1,19	-	-	
			Q2,19	-	-	
8M, 3V SERIAL FLASH	W25Q80DV	0.09 μm	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	
8M 1.8V SERIAL FLASH	W25Q80EW	0.09 μm	Q3,18	77	0	
			Q4,18	77	0	
			Q1,19	77	0	
			Q2,19	77	0	



2.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.046 μm CMOS/DPDM 3V NAND Flash	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.046 μm CMOS/DPDM 3V SPI NAND Flash	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.046 μm CMOS/DPDM 1.8V SPI NAND Flash	Q3,18	231	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.046 μm CMOS/DPDM 1.8V NAND Flash	Q3,18	231	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.058 μm CMOS/DPTM 3V Serial Flash	Q3,18	231	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.058 μm CMOS/DPTM 1.8V Serial Flash	Q3,18	231	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	
0.09 μm CMOS/DPTM 3V Serial Flash	Q3,18	77	0	
	Q4,18	77	0	
	Q1,19	77	0	
	Q2,19	77	0	



Quality and Reliability Report

0.09 μ m	Q3,18	77	0	
CMOS/DPTM	Q4,18	77	0	
1.8V Serial Flash	Q1,19	77	0	
	Q2,19	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	Q3,18	38	0	
			Q4,18	38	0	
			Q1,19	38	0	
			Q2,19	38	0	
1G, 3V SPI NAND FLASH	W25N01GV	0.046 μm	Q3,18	38	0	
			Q4,18	38	0	
			Q1,19	-	-	
			Q2,19	-	-	
512M, 3V SPI NAND FLASH	W25N512GV	0.046 μm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	38	0	
			Q2,19	38	0	
1G, 1.8V SPI NAND FLASH	W25N01GW	0.046 μm	Q3,18	114	0	
			Q4,18	38	0	
			Q1,19	38	0	
			Q2,19	38	0	
1G, 1.8V NAND FLASH	W29N01HZ	0.046 μm	Q3,18	114	0	
			Q4,18	38	0	
			Q1,19	38	0	
			Q2,19	38	0	
16M, 3V SERIAL FLASH	W25Q16JV	0.058 μm	Q3,18	114	0	
			Q4,18	-	-	
			Q1,19	-	-	
			Q2,19	-	-	
64M, 3V SERIAL FLASH	W25Q64JV	0.058 μm	Q3,18	-	-	
			Q4,18	38	0	
			Q1,19	38	0	
			Q2,19	38	0	



256M, 1.8V SERIAL FLASH	W25Q256JW	0.058 μm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	38	0	
			Q2,19	38	0	
64M, 1.8V SERIAL FLASH	W25Q64FW	0.058 μm	Q3,18	114	0	
			Q4,18	38	0	
			Q1,19	-	-	
			Q2,19	-	-	
8M, 3V SERIAL FLASH	W25Q80DV	0.09 μm	Q3,18	38	0	
			Q4,18	38	0	
			Q1,19	38	0	
			Q2,19	38	0	
8M, 1.8V SERIAL FLASH	W25Q80EW	0.09 μm	Q3,18	38	0	
			Q4,18	38	0	
			Q1,19	38	0	
			Q2,19	38	0	



2.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.046 μ m CMOS/DPDM 3V NAND Flash	Q3,18	38	0	
	Q4,18	38	0	
	Q1,19	38	0	
	Q2,19	38	0	
0.046 μ m CMOS/DPDM 3V SPI NAND Flash	Q3,18	38	0	
	Q4,18	38	0	
	Q1,19	38	0	
	Q2,19	38	0	
0.046 μ m CMOS/DPDM 1.8V SPI NAND Flash	Q3,18	114	0	
	Q4,18	38	0	
	Q1,19	38	0	
	Q2,19	38	0	
0.046 μ m CMOS/DPDM 1.8V NAND Flash	Q3,18	114	0	
	Q4,18	38	0	
	Q1,19	38	0	
	Q2,19	38	0	
0.058 μ m CMOS/DPTM 3V Serial Flash	Q3,18	114	0	
	Q4,18	38	0	
	Q1,19	38	0	
	Q2,19	38	0	
0.058 μ m CMOS/DPTM 1.8V Serial Flash	Q3,18	114	0	
	Q4,18	38	0	
	Q1,19	38	0	
	Q2,19	38	0	
0.09 μ m CMOS/DPTM 3V Serial Flash	Q3,18	38	0	
	Q4,18	38	0	
	Q1,19	38	0	
	Q2,19	38	0	
0.09 μ m CMOS/DPTM 1.8V Serial Flash	Q3,18	38	0	
	Q4,18	38	0	
	Q1,19	38	0	
	Q2,19	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	Q3,18	39	0	
			Q4,18	39	0	
			Q1,19	39	0	
			Q2,19	39	0	
1G, 3V SPI NAND FLASH	W25N01GV	0.046 µm	Q3,18	39	0	
			Q4,18	39	0	
			Q1,19	-	-	
			Q2,19	-	-	
512M, 3V SPI NAND FLASH	W25N512GV	0.046 µm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	39	0	
			Q2,19	39	0	
1G, 1.8V SPI NAND FLASH	W25N01GW	0.046 µm	Q3,18	117	0	
			Q4,18	39	0	
			Q1,19	39	0	
			Q2,19	39	0	
1G, 1.8V NAND FLASH	W29N01HZ	0.046 µm	Q3,18	117	0	
			Q4,18	39	0	
			Q1,19	39	0	
			Q2,19	39	0	
16M, 3V SERIAL FLASH	W25Q16JV	0.058 µm	Q3,18	117	0	
			Q4,18	-	-	
			Q1,19	-	-	
			Q2,19	-	-	



64M, 3V SERIAL FLASH	W25Q64JV	0.058 μm	Q3,18	-	-	
			Q4,18	39	0	
			Q1,19	39	0	
			Q2,19	39	0	
256M, 1.8V SERIAL FLASH	W25Q256JW	0.058 μm	Q3,18	-	-	
			Q4,18	-	-	
			Q1,19	77	0	
			Q2,19	77	0	
64M, 1.8V SERIAL FLASH	W25Q64FW	0.058 μm	Q3,18	117	0	
			Q4,18	39	0	
			Q1,19	-	-	
			Q2,19	-	-	
8M, 3V SERIAL FLASH	W25Q80DV	0.09 μm	Q3,18	39	0	
			Q4,18	39	0	
			Q1,19	39	0	
			Q2,19	39	0	
8M, 1.8V SERIAL FLASH	W25Q80EW	0.09 μm	Q3,18	39	0	
			Q4,18	39	0	
			Q1,19	39	0	
			Q2,19	39	0	



2.2 By Process

Design Rule Technology	Period	No. of Samples	No. of Fails	Reject Information
0.046 μ m CMOS/DPDM 3V NAND Flash	Q3,18	39	0	
	Q4,18	39	0	
	Q1,19	39	0	
	Q2,19	39	0	
0.046 μ m CMOS/DPDM 3V SPI NAND Flash	Q3,18	39	0	
	Q4,18	39	0	
	Q1,19	39	0	
	Q2,19	39	0	
0.046 μ m CMOS/DPDM 1.8V SPI NAND Flash	Q3,18	117	0	
	Q4,18	39	0	
	Q1,19	39	0	
	Q2,19	39	0	
0.046 μ m CMOS/DPDM 1.8V NAND Flash	Q3,18	117	0	
	Q4,18	39	0	
	Q1,19	39	0	
	Q2,19	39	0	
0.058 μ m CMOS/DPTM 3V Serial Flash	Q3,18	117	0	
	Q4,18	39	0	
	Q1,19	39	0	
	Q2,19	39	0	
0.058 μ m CMOS/DPTM 1.8V Serial Flash	Q3,18	117	0	
	Q4,18	39	0	
	Q1,19	39	0	
	Q2,19	39	0	
0.09 μ m CMOS/DPTM 3V Serial Flash	Q3,18	39	0	
	Q4,18	39	0	
	Q1,19	39	0	
	Q2,19	39	0	



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0.09 μm	Q3,18	39	0	
CMOS/DPTM	Q4,18	39	0	
1.8V Serial Flash	Q1,19	39	0	
	Q2,19	39	0	



Electrostatic Discharge (ESD) Test

1. Test Condition

Human Body Mode.

According to JESD22-A114.

2. Dynamic RAM Products

Product Type	Design Rule (μm)	No. of DUT	Pass Voltage (HBM)
64M x 16 (1.9 V)	0.065	12	> 2 kV
16M x 16 (2.7 V)	0.065	12	> 2 kV
32M x 16 (1.8 V)	0.065	12	> 2 kV
16M x 16 (1.8 V)	0.065	12	> 2 kV
8M x 16 (2.7 V)	0.065	12	> 2 kV
8M x 16 (1.8 V)	0.065	12	> 2 kV
4M x 16 (2.7 V)	0.065	12	> 2 kV
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



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



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 (1.9 V)	0.065	6	> 200 mA
16M x 16 (2.7 V)	0.065	6	> 200 mA
32M x 16 (1.8 V)	0.065	6	> 200 mA
16M x 16 (1.8 V)	0.065	6	> 200 mA
8M x 16 (2.7 V)	0.065	6	> 200 mA
8M x 16 (1.8 V)	0.065	6	>200 mA
4M x 16 (2.7 V)	0.065	6	> 200 mA
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



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