

Technical Change Notice (TCN)

Purpose:

Due to the evolution of Samsung NAND flash generation, 42nm will be phased in to replace the current 60nm with product model number (M/N) remains. In order for better understanding about the changes, the following contents will be focused on:

1. Technical comparison between 60nm and 42nm based on the *component level* and *SSD level*.
2. The change coverage of NAND flash:
 - 1G bit / 2G bit / 4G bit SLC
 - 8G bit / 16G bit SLC (Composed of 4G bit)

Component Level

Key Parameters in Design & Feature Specification

The following contents are the comparison tables between 60nm and 42nm in 1G / 2G / 4G bit NAND flash.

<1G bit>

Item		60nm	42nm
Cell Size		0.0189819 um ²	0.01091um ²
Chip Size		9,014um x 6,779um	6,783 x 6,346um
Vcc		2.7~3.6V	2.7~3.6V
Operating Characteristics	Read	Max 30mA	Max 35mA
	Program		
	Erase		
P/E Endurance		100K cycle (1-bit ECC)	100K cycle (1-bit ECC)
Read EDC Status		N/A	N/A
Erase time		Max. 10ms	Max. 10ms

<2G bit>

Item		60nm	42nm
Cell Size		0.0189819 um ²	0.01091um ²
Chip Size		9,014um x 6,779um	6,783 x 6,346um
Vcc		2.7~3.6V	2.7~3.6V
Operating Characteristics	Read	Max 30mA	Max 35mA
	Program		
	Erase		
P/E Endurance		100K cycle (1-bit ECC)	100K cycle (1-bit ECC)
Read EDC Status		N/A	N/A
Erase time		Max. 10ms	Max. 10ms

<4G bit>

Item		60nm	42nm
Cell Size		0.0189819 um ²	0.00923um ²
Chip Size		8,914um x 11,444um	4,176.8um x 16,146um
Vcc		2.7~3.6V	2.7~3.6V
Operating Characteristics	Read	Max 30mA	Max 35mA
	Program		
	Erase		
P/E Endurance		100K cycle (1-bit ECC)	100K cycle (1-bit ECC)
Read EDC Status		N/A	N/A
Erase time		Max. 10ms	Max. 10ms

When the NAND has changed from 60nm to 42nm, there are the changes on cell and chip size and the operating characteristics with 5mA increased. On the SSD level, there will be no impacts for these changes.

SSD Level

Qualification Process

The identical qualification process for 60nm-based SSD will be applied to all 42nm models as well. The following table will show Apacer test items for 42nm-based models.

Test Items
Basic Functional Test – (Fdisk / Format / OS installation)
Full Test on all sectors – 48 hr (Write / Read / Verify)
Random sector test – 500 loops (Write / Read / Verify)
Burn-in test – 24+ hrs

Performance Test

A slight performance difference between 60nm and 42nm. The following table has shown the results of the performance test.

NAND Flash	Product Capacity	Process	Sequential Read*	Sequential Write*
1Gb	256MB (1Gb x 2)	60nm	30	11
		42nm	28	9
2Gb	512MB (2Gb x 2)	60nm	31	10
		42nm	26	7
4Gb	1GB (4Gb x 2)	60nm	31	10
		42nm	30	9
8Gb	2GB (8Gb x 2)	60nm	31	11
		42nm	28	8
16Gb	4GB (16Gb x 2)	60nm	36	16
		42nm	35	12

* Unit: MB/s

Note: Test results vary with platform configurations

Summary

According to the data above, it has shown the full compatibility on both host-to-controller and controller-to-NAND to the change of NAND flash process.