Migration from S34MS-1 to S34MS-2

AN200508 details how to migrate designs from SkyHigh S34MS-1 (S34MS01G1, S34MS02G1, S34MS04G1, and S34MS08G1) NAND flash memory devices to SkyHigh S34MS-2 (S34MS01G2, S34MS02G2, S34MS04G2, and S34MS08G2) NAND flash memory devices.

1 Introduction

This application note details how to migrate designs from SkyHigh S34MS-1 (S34MS01G1, S34MS02G1, S34MS04G1, and S34MS08G1) NAND flash memory devices to SkyHigh S34MS-2 (S34MS01G2, S34MS02G2, S34MS04G2, and S34MS08G2) NAND flash memory devices. The S34MS-1 devices are 1.8 volt NAND flashmemory manufactured with 4x nm technology. The S34MS-2 devices are 1.8 volt NAND flash memory manufactured with 32 nm technology node.

Note: All the information provided in this guide illustrates only the differences for each section. Refer to the respective data sheets for more information.

SkyHigh S34MS 4x NAND flash family devices are compatible with the SkyHigh 32 nm NAND flash memory devices with respect to:

- Block, page, and byte size architecture
- JEDEC standard-compliant software command set

Note: The spare area for 32 nm, x8, 2 Gb / 4 Gb / 8 Gb is 128 bytes instead of 64 bytes. The spare area for 32 nm, x16, 2 Gb / 4 Gb is 64 words instead of 32 words.

2 Feature Comparison

Most of the features between S34MS-1 and S34MS-2 are similar, as shown in Table 1. Refer to the respective S34MS-1 and S34MS-2 data sheets to verify any other features.

Table 1. Feature Comparison (Sheet 1 of 2)

Features	48 nm / 41 nm	32 nm
Page Size	2 kB	2 kB
Number of Pages per Block	64	64
Number of Blocks	1024 for every 1Gb	1024 for every 1Gb
Densities	1 Gb / 2 Gb / 4 Gb / 8 Gb (DDP)	1 Gb / 2 Gb / 4 Gb / 8 Gb (DDP)
Interface	ONFI 1.0	ONFI 1.0
t_R	25 µs	25 µs (1 Gb) 30 µs (2 Gb / 4 Gb / 8 Gb)
Sequential Access	45 ns	45 ns
t_{PROG}	250 µs	300 µs
t_{BERS}	2 ms (1 Gb) 3.5 ms (2 Gb / 4 Gb / 8 Gb)	3 ms (1 Gb) 3.5 ms (2 Gb / 4 Gb / 8 Gb)
Spare Area per Page Size	64B / 2 kB (All densities)	64B / 2 kB (1 Gb) 128B / 2 kB (2 Gb / 4 Gb / 8 Gb)
ECC Requirement	1-bit / 512 + 16 bytes	4-bi t / 512 + 16 bytes (1 Gb) 512 + 32 bytes (2 Gb / 4 Gb / 8 Gb)
Cycling (Typical)	100K	100K
Retention (Typical)	10-year	10-year
V_{CC}	1.8V	1.8V

Table 1. Feature Comparison (Sheet 2 of 2)

Features	48 nm / 41 nm	32 nm
I/O Bus Width	x8 and x16	x8 and x16
Secure Block Feature	OTP (1 Block) (1)	OTP (1 Block)
Reset after Power-up	Not required	Not required
Packages	48-Pin TSOP / 63-Ball BGA	48-Pin TSOP / 63-Ball BGA / 67-Ball BGA
Read Uniquie ID	Not supported	Supported

Note:
1. *For 41 nm only.*

3 AC Specification

The S34MS-1 and S34MS-2 have primarily compatible specifications. Differences in AC Characteristics between the devices are highlighted in Table 2. The potential impact of any parameter specification differences should be evaluated and validated. Refer to the respective S34MS-1 and S34MS-2 data sheets to verify the most up to date specifications.

Table 2. AC Characteristics

Parameter	Symbol	S34MS-1			S34MS-2		
		Min	Max	Unit	Min	Max	Unit
CE# high to output High-Z	t_{CHZ}	—	30	ns	—	50 **(1 Gb)**	ns
					—	30 **(2 / 4 Gb)**	
Data transfer from cell to register	t_R	—	25	µs	—	25 **(1 Gb)**	µs
					—	30 **(2 / 4 / 8 Gb)**	

Table 3. AC Test Conditions

Parameter	S34MS-1	S34MS-2
Output load (1.7V-1.95V) 1 TTL Gate and CL	30 pF	30 pF

4 DC Specification

The S34MS-1 and S34MS-2 have primarily compatible specifications. Differences in DC Characteristics between the devices are highlighted in Table 4. The potential impact of any parameter specification differences should be evaluated and validated. Refer to the respective S34MS-1 and S34MS-2 data sheets to verify the most up to date specifications.

Table 4. DC Characteristics and Operating Conditions

Parameter	Symbol	Test Conditions	S34MS-1				S34MS-2			
			Min	Typ	Max	Units	Min	Typ	Max	Units
Power-On Current	I_{CC0}	Power-Up Current	—	15 **(2 Gb/4 Gb)**	30	mA				
		FFh command input after power on					—	—	50 per device	mA
Sequential Read Current	I_{CC1}	t_{RC} = 45 (min) **(S34MS-1)** t_{RC} = t_{RC} (min) **(S34MS-2)** CE#=V_{IL}, I_{OUT} = 0 mA	—	10	20	mA	—	15	30	mA
Program Current	I_{CC2}	Normal	—	10	20	mA	—	15	30	mA
		Cache	—	15	30	mA	—	15	30	mA
Erase Current	I_{CC3}	—	—	10	20	mA	—	15	30	mA

5 Device ID

This section provides a comparison between S34MS-1 and S34MS-2 flash memory Device ID.

Table 5. Manufacture/Device ID

S34MS-1						
Density	**Org**	**1st**	**2nd**	**3rd**	**4th**	**5th**
1 Gb	x8	01h	A1h	00h	15h	—
2 Gb		01h	AAh	90h	15h	44h
4 Gb		01h	ACh	90h	15h	54h
1 Gb	x16	01h	B1h	00h	55h	—
2 Gb		01h	BAh	90h	55h	44h
4 Gb		01h	BCh	90h	55h	54h
S34MS-2						
Density	**Org**	**1st**	**2nd**	**3rd**	**4th**	**5th**
1 Gb	x8	01h	A1h	80h	15h	—
2 Gb		01h	AAh	90h	15h	46h
4 Gb		01h	ACh	90h	15h	56h
8 Gb (1)		01h	A3h	D1h	15h	5Ah
1 Gb	x16	01h	B1h	80h	55h	—
2 Gb		01h	BAh	90h	55h	46h
4 Gb		01h	BCh	90h	55h	56h

Note:

1. *4 Gb x 2 – DDP with one CE#.*

6 References

- SkyHigh SLC NAND Flash Memory for Embedded Data Sheet, Publication Number S34MS01G1_4G1
- SkyHigh SLC NAND Flash Memory for Embedded Data Sheet, Publication Number S34MS01G2_4G2
- S34MS08G2 NAND Flash Memory for Embedded Data Sheet, Publication Number S34MS08G2

Document History Page

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**	–	–	12/11/2014	Initial version.
*A	4977228	MSWI	10/20/2015	Updated to Cypress template.
*B	5869109	AESATMP8	08/31/2017	Updated logo and Copyright.
*C	6403803	MNAD	12/06/2018	Updated to new template. Completing Sunset Review.
*D		MNAD	05/31/2017	Updated to SkyHigh format.