

## Migration from S34ML-1 to S34ML-2

**SkyHigh 4x nm, 3-V NAND Flash Memory Devices (1 Gb / 2 Gb / 4 Gb / 8 Gb)  
to  
SkyHigh 32 nm, 3-V NAND Flash Memory Devices (1 Gb / 2 Gb / 4 Gb / 8 Gb)**

AN200516 details how to migrate designs from SkyHigh S34ML-1 (S34ML01G1, S34ML02G1, S34ML04G1, and S34ML08G1) NAND flash memory devices to SkyHigh S34ML-2 (S34ML01G2, S34ML02G2, S34ML04G2, and S34ML08G2) NAND flash memory devices.

### 1 Introduction

This application note details how to migrate designs from SkyHigh S34ML-1 (S34ML01G1, S34ML02G1, S34ML04G1, and S34ML08G1) NAND flash memory devices to SkyHigh S34ML-2 (S34ML01G2, S34ML02G2, S34ML04G2, and S34ML08G2) NAND flash memory devices. The S34ML-1 devices are 3.0 volt NAND flash memory manufactured with 4x nm technology. The S34ML-2 devices are 3.0 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. Please refer to the respective data sheets for more information.

SkyHigh S34ML 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 2 Gb / 4 Gb / 8 Gb is 128 bytes instead of 64 bytes.

### 2 Feature Comparison

Most of the features between S34ML-1 and S34ML-2 are similar, as shown in [Table 1](#). Refer to the respective S34ML-1 and S34ML-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 <sub>R</sub>	25 μs	25 μs (1 Gb) 30 μs (2 Gb / 4 Gb / 8 Gb)
Sequential Access	25 ns	25 ns
t <sub>PROG</sub>	200 μs	300 μs
t <sub>BERS</sub>	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)

Table 1. Feature Comparison (Sheet 2 of 2)

Features	48 nm / 41 nm	32 nm
ECC Requirement	1-bit / 512 + 16 bytes	4-bit / 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 <sub>CC</sub>	3.3V	3.3V
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 Unique ID	Not supported	Supported

Note:

1. For 41 nm only.

### 3 AC Specification

The S34ML-1 and S34ML-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 S34ML-1 and S34ML-2 data sheets to verify the most up to date specifications.

Table 2. AC Characteristics

Parameter	Symbol	S34ML-1			S34ML-2		
		Min	Max	Unit	Min	Max	Unit
Data transfer from cell to register	t <sub>R</sub>	—	25	μs	—	25 (1 Gb)	μs
					—	30 (2 / 4 / 8 Gb)	μs

Table 3. AC Test Conditions

Parameter	S34ML-1	S34ML-2
Output load (2.7V-3.6V) 1 TTL Gate and CL	50 pF	50 pF

### 4 DC Specification

The S34ML-1 and S34ML-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 S34ML-1 and S34ML-2 data sheets to verify the most up to date specifications.

## 5 Device ID

Table 4. . DC Characteristics and Operating Conditions

Parameter	Symbol	Test Conditions	S34ML-1				S34ML-2			
			Min	Typ	Max	Units	Min	Typ	Max	Units
Power-On Current	I <sub>CC0</sub>	Power-Up Current	—	15 (2 Gb / 4 Gb)	30	mA				
		FFh command input after power on					—	—	50 per device	mA
Sequential Read Current	I <sub>CC1</sub>	t <sub>RC</sub> = 25 (min) <b>(S34ML-1)</b>  t <sub>RC</sub> = t <sub>RC</sub> (min) <b>(S34ML-2)</b>  CE#=V <sub>IL</sub> , I <sub>OUT</sub> = 0 mA	—	15	30	mA	—	15	30	mA
Program Current	I <sub>CC2</sub>	Normal	—	15	30	mA	—	15	30	mA
		Cache	—	20	40	mA	—	15	30	mA
Erase Current	I <sub>CC3</sub>	—	—	15	30	mA	—	15	30	mA

This section provides a comparison between S34ML-1 and S34ML-2 flash memory Device ID.

Table 5. Manufacture/Device ID

S34ML-1						
Density	Org	1st	2nd	3rd	4th	5th
1 Gb	x8	01h	F1h	00h	1Dh	—
2 Gb		01h	DAh	90h	95h	44h
4 Gb		01h	DCh	90h	95h	54h
8 Gb (1) (2)		01h	DCh D3h	—	—	—
1 Gb	x16	01h	C1h	00h	5Dh	—
2 Gb		01h	CAh	90h	D5h	44h
4 Gb		01h	CCh	90h	D5h	54h
S34ML-2						
Density	Org	1st	2nd	3rd	4th	5th
1 Gb	x8	01h	F1h	80h	1Dh	—
2 Gb		01h	DAh	90h	95h	46h
4 Gb		01h	DCh	90h	95h	56h
8 Gb (2)		01h	D3h	D1h	95h	5Ah
1 Gb	x16	01h	C1h	80h	5Dh	—
2 Gb		01h	CAh	90h	D5h	46h
4 Gb		01h	CCh	90h	D5h	56h

**Notes:**

1. 4 Gb x 2 – DDP with two CE#.
2. 4 Gb x 2 – DDP with one CE#.

## 6 References

- [SkyHigh SLC NAND Flash Memory for Embedded Data Sheet, Publication Number S34ML01G1\\_4G1](#)
- [S34ML08G1 NAND Flash Memory for Embedded Data Sheet, Publication Number S34ML08G1](#)
- [SkyHigh SLC NAND Flash Memory for Embedded Data Sheet, Publication Number S34ML01G2\\_4G2](#)

## Document History Page

Document Title: AN200516 - Migration from S34ML-1 to S34ML-2				
Document Number: 002-00516				
Rev.	ECN No.	Orig. of Change	Submission Date	Description of Change
**	–	–	12/11/2014	Initial version
*A	4931122	YOQI	09/23/2015	Updated in Cypress template
*B	5813075	AESATMP8	07/12/2017	Updated logo and Copyright.
*C	6272156	MNAD	08/03/2018	Updated template
*D		MNAD	05/03/2018	Updated to SkyHigh format