Migration from Samsung K9F1G08U0D to Spansion® S34ML01G1

Application Note

1. Overview

This application note details how to migrate designs from a Samsung K9F1G08U0D NAND flash memory device to a Spansion S34ML01G1 NAND flash memory device. The S34ML01G1 device is a 3.0 volt, x8-only, NAND flash memory manufactured with 4x nm technology.

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.

The Spansion S34ML01G NAND flash memory device is compatible with the Samsung K9F1G08U0D NAND flash memory device with respect to block, page size, and command set.

2. Feature Comparison

Most of the features between the S34ML01G1 and K9F1G08U0D are similar, except a few differences that are highlighted in Table 2.1. Refer to the respective Samsung K9F1G08U0D and Spansion S34ML01G1 data sheets to verify any other features.

Table 2.1 Feature Comparison

Parameter	Spansion S34ML01G1	Samsung K9F1G08U0D
Random Access	25 µs (Max)	35 µs (Max)
Sequential Access	25 ns (Min)	30 ns (Min)
Page Program Time	200 µs (Typ)	250 µs (Typ)

3. Command Set

All commands supported by the K9F1G08U0D can be used on the S34ML01G1. The S34ML01G1 supports some additional commands. Table 3.1 shows the supported command list.

Table 3.1 Command Set

Command	Supported on S34ML01G1	Supported on K9F1G08U0D
Page Read	Yes	Yes
Page Program	Yes	Yes
Random Data Input	Yes	Yes
Random Data Output	Yes	Yes
Block Erase	Yes	Yes
Copy Back Read	Yes	Yes
Copy Back Program	Yes	Yes
Read Status Register	Yes	Yes
Reset	Yes	Yes
Read ID	Yes	Yes
Read ID2	Yes	No
Read ONFI Signature	Yes	No
Read Parameter Page	Yes	No
Read Cache	Yes	No
Read Cache End	Yes	No
One-time Programmable (OTP) Area Entry	Yes	No

4. Absolute Maximum Ratings

Differences in Absolute Maximum Ratings are highlighted in Table 4.1.

Table 4.1 Absolute Maximum Ratings

Parameter	Symbol	Spansion S34ML01G1		Samsung K9F1G08U0D	
		Value	Unit	Value	Unit
Temperature under Bias	T_{BIAS}	-50 to +125	°C	-10 to +125 (K9F1G08U0D-SCB0) -40 to +125 (K9F1G08U0D-SIB0)	°C

5. AC Characteristics

The S34ML01G1 and K9F1G08U0D have primarily compatible specifications. Differences in AC Characteristics between the devices are highlighted in Table 5.1. The potential impact of any parameter specification differences should be evaluated and validated. Refer to the respective Samsung K9F1G08U0D and Spansion S34ML01G1 data sheets to verify the most up to date specifications.

Table 5.1 AC Characteristics

Parameter	Symbol	Spansion S34ML01G1			Samsung K9F1G08U0D		
		Min	Max	Unit	Min	Max	Unit
ALE Setup Time	t_{ALS}	10	—	ns	15	—	ns
Address to Data Loading Time	t_{ADL}	70	—	ns	100	—	ns
CLE Setup Time	t_{CLS}	10	—	ns	15	—	ns
CE# High to ALE or CLE Don't Care	t_{CSD}	10	—	ns	0	—	ns
Data Setup Time	t_{DS}	10	—	ns	15	—	ns
Data Transfer from Cell to Register	t_R	—	25	µs	—	35	µs
Read Cycle Time	t_{RC}	25	—	ns	30	—	ns
RE# Pulse Width	t_{RP}	12	—	ns	15	—	ns
Write Cycle Time	t_{WC}	25	—	ns	30	—	ns
WE# Pulse Width	t_{WP}	12	—	ns	15	—	ns

6. DC Characteristics

The S34ML01G1 and K9F1G08U0D have primarily compatible specifications. Differences in DC Characteristics between the devices are highlighted in Table 6.1. The potential impact of any parameter specification differences should be evaluated and validated. Refer to the respective Samsung K9F1G08U0D and Spansion S34ML01G1 data sheets to verify the most up to date specifications.

Table 6.1 DC Characteristics

Parameter		Symbol	Spansion S34ML01G1			Samsung K9F1G08U0D		
			Typ	Max	Unit	Typ	Max	Unit
Operating Current	Sequential Read	I_{CC1}	15	30	mA	20	35	mA
	Program	I_{CC2}						
	Erase	I_{CC3}						

7. Pin Capacitance

Table 7.1 shows the differences in pin capacitance between the S34ML01G1 and K9F1G08U0D.

Table 7.1 Pin Capacitance

Parameter	Symbol	Test Condition	Spansion S34ML01G1			Samsung K9F1G08U0D		
			Min	Max	Unit	Min	Max	Unit
Input	C_{IN}	V_{IN} = 0V	—	10	pF	—	8	pF
Input / Output	C_{IO}	V_{IL} = 0V	—	10	pF	—	8	pF

8. Device ID

Table 8.1 shows the device ID comparison between the S34ML01G1 and K9F1G08U0D.

Table 8.1 Manufacturer / Device ID

Spansion S34ML01G1					Samsung K9F1G08U0D				
1st	**2nd**	**3rd**	**4th**	**5th**	**1st**	**2nd**	**3rd**	**4th**	**5th**
01h	F1h	00h	1Dh	—	ECh	F1h	00h	15h	40h

9. References

- Spansion S34ML01G1 Data Sheet
- Samsung K9F1G08U0D Data Sheet

10. Revision History

Section	Description
Revision 01 (May 8, 2013)	
	Initial release

Colophon

The products described in this document are designed, developed and manufactured as contemplated for general use, including without limitation, ordinary industrial use, general office use, personal use, and household use, but are not designed, developed and manufactured as contemplated (1) for any use that includes fatal risks or dangers that, unless extremely high safety is secured, could have a serious effect to the public, and could lead directly to death, personal injury, severe physical damage or other loss (i.e., nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system), or (2) for any use where chance of failure is intolerable (i.e., submersible repeater and artificial satellite). Please note that Spansion will not be liable to you and/or any third party for any claims or damages arising in connection with above-mentioned uses of the products. Any semiconductor devices have an inherent chance of failure. You must protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy, fire protection, and prevention of over-current levels and other abnormal operating conditions. If any products described in this document represent goods or technologies subject to certain restrictions on export under the Foreign Exchange and Foreign Trade Law of Japan, the US Export Administration Regulations or the applicable laws of any other country, the prior authorization by the respective government entity will be required for export of those products.

Trademarks and Notice

The contents of this document are subject to change without notice. This document may contain information on a Spansion product under development by Spansion. Spansion reserves the right to change or discontinue work on any product without notice. The information in this document is provided as is without warranty or guarantee of any kind as to its accuracy, completeness, operability, fitness for particular purpose, merchantability, non-infringement of third-party rights, or any other warranty, express, implied, or statutory. Spansion assumes no liability for any damages of any kind arising out of the use of the information in this document.