



AN309006

Migration Guide

How to Migrate to Numonyx M29W800D from Spansion* S29AL008J/D Flash Memory

This application note explains how to migrate an application based on the Spansion*¹ S29AL008D/J Flash memory device to an application based on the Numonyx™ M29W800D flash memory device. This document does not provide detailed information on the devices, but highlights the similarities and differences between them. The comparison takes into consideration the signal descriptions, packages, architecture, software command set, performance, and block protections.

Introduction

The Numonyx M29W800D memory, manufactured on the mature 110nm technology is a reliable memory (min 100,000 cycles, 20 years data retention) ideal for all applications needing a fast parallel NOR device (available in 70 or 45 ns access times). More than 360 million devices† shipped worldwide on this technology between 2005 and the founding of Numonyx in 2008. Customers can rely on Numonyx (the merger of Intel and STMicroelectronics flash memory groups) to continue delivering highly reliable and mature products on this technology.

Using the industry standard command set, the M29W800D can replace many competitors' parts, such as the Spansion S29AL008D/J device.

M29W800D is offered in -40 °C to 85 °C, industrial temperature range. The version in -40 °C to 125 °C extended temperature range and related automotive compliance is called M29W800F. Please refer to separate datasheet and contact your local sales for availability of your preferred combination.

M29W800D and M29W800F are processed in same technology and have equivalent timings

†Overall total including different memory densities

Memory architecture and protection groups

The Spansion S29AL008J/D and Numonyx M29W800D memory products can be used in byte (x8) or word (x16) mode. The blocks in both these memories are asymmetrically arranged with 15 main blocks of 64Kbytes each, 1 boot block of 16Kbytes, 2 parameter blocks of 8Kbytes and a small main block of 32Kbytes. The S29AL008J also includes a 256 byte secure region which is permanently locked at the factory. M29W800D offers a Unique-ID via CFI query.

On the S29AL008J/D and M29W800D, any block can be protected independently from the others.

¹ *Other names and brands may be claimed as the property of others.

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Hardware migration

This section provides a detailed comparison between S29AL008J/D and M29W800D signals and package pin-out.

Signal description

A comparison between the S29AL008J/D and M29W800D signals is shown here.

Table 1: Signal description for the S29AL008J/D and M29W800D devices

Signal Name			Description	Input / Output
S29AL008J	S29AL008D	M29W800D		
A0-A18			Address Inputs	Inputs
DQ0-DQ14			15 Data Input/Outputs	I/O
DQ15/A ₁			DQ15 (Data I/O, word mode) A ₁ (LSB address, byte mode)	I/O
BYTE#		$\overline{\text{BYTE}}$	Byte/Word Organization Select	Input
CE#		$\overline{\text{E}}$	Chip Enable	Input
OE#		$\overline{\text{G}}$	Output Enable	Input
WE#		$\overline{\text{W}}$	Write Enable	Input
RESET#		$\overline{\text{RP}}$	Reset/Block Temporary Unprotect	Input
RY/BY#		$\overline{\text{RB}}$	Ready/Busy Output	Output
VCC			Supply Voltage	Supply
VSS			Ground	
WP# ⁽¹⁾	N/A		Write Protect/Program Acceleration	Input

⁽¹⁾ S29AL008D and M29W800D do not have a write protect pin. Customers that require this feature should use the 32Mbit M29W320D.

Packages

Both the S29AL008J/D and the M29W800D devices are offered in TSOP48 (20mm x 12mm) and BGA packages. The M29W800D BGA package is smaller (6mm x 8mm) than that of the S29AL008J/D BGA package (6.15mm x 8.15mm).

The M29W800D is fully pin-to-pin compatible with the S29AL008D. M29W800D is pin-to-pin compatible with the S29AL008J, with the exception of the WP# pin. M29W800D does not include the WP# signal which is a NC (no-connect) on the package.

Refer to the S29AL008J/D and M29W800D datasheets for details on the packages.

Software Command Set

The M29W800D and S29AL008D feature an identical set of standard commands. The S29AL008J contains an additional command to enter/exit the secured region.

Table 2: Software commands for the S29AL008J/D and M29W800D devices

Commands	M29W800D	S29AL008D	S29AL008J
Read/Reset	✓	✓	✓
Autoselect	✓	✓	✓
CFI Query	✓	✓	✓
Program	✓	✓	✓
Unlock Bypass	✓	✓	✓
Unlock Bypass Program	✓	✓	✓
Unlock Bypass Reset	✓	✓	✓
Chip Erase	✓	✓	✓
Block Erase	✓	✓	✓
Erase Suspend	✓	✓	✓
Erase Resume	✓	✓	✓
Enter Secure Sector			✓
Exit Secure Sector			✓

Device codes and auto select codes

The auto select codes are composed of the manufacturer code, the device code and the block protection status. The S29AL008J/D and M29W800D devices have a different manufacturer code and device code.

The S29AL008J/D and M29W800D devices use identical commands and address inputs to read the auto select codes.

Table 3: Auto select codes, x16

	Spansion		Numonyx	
Auto select code	S29AL008J/D (01 model) ¹	S29AL008J/D (02 model) ²	M29W800DT ⁽¹⁾	M29W800DB ⁽²⁾
Manufacturer code	XX01h		0020h	
Device code	22DAh	225Bh	22D7h	225Bh
Block protection status	XX01h (protected) XX00h (unprotected)		0001h (protected) 0000h (unprotected)	

⁽¹⁾ Top boot block.

⁽²⁾ Bottom boot block.

Table 4: Auto select codes, x8

	Spansion		Numonyx	
Auto select code	S29AL008J/D (01 model) ¹	S29AL008J/D (02 model) ²	M29W800DT1	M29W800DB2
Manufacturer code	01h		20h	
Device code	DAh	5Bh	D7h	5Bh
Block protection status	01h (protected) 00h (unprotected)			

⁽¹⁾ Top boot block.

⁽²⁾ Bottom boot block.

Performance and specifications

The M29W800D and S29AL008D/J have almost compatible DC and AC characteristics (see below for details).

Access Time

The M29W800D has a random access time of 45 ns or 70 ns. The S29AL008D has a random access time of 55 ns, 60 ns, 70 ns, or 90 ns. The 55 ns access time is only available with the reduced voltage range of $V_{CC} = 3.0\text{ V} - 3.6\text{ V}$. The S29AL008J has a random access time of either 55 ns or 70 ns. On the S29AL008D the 55 ns access time is only available with the reduced voltage range of $V_{CC} = 3.0\text{ V} - 3.6\text{ V}$, while the M29W400D guarantees this access time also for V_{CC} as low as 2.7 V.

Program and Erase Times

Program and erase time differences are shown here.

Table 5: Program and Erase specifications

Parameter	S29AL008D		S29AL008J		M29W800D		Unit
	Typ	Max	Typ	Max	Typ	Max	
Block Erase	0.7	10	0.5	10	0.8	1.6	s
Chip Erase	14		16		12	25	s
Byte/Word program	7	210	6	150	10	200	μs
Chip Program (word)	5.8	17			6	30	s
Chip Program (byte)	8.4	25			12	60	s

DC specifications

Table 6: DC specification differences

Parameter	Description	S29AL008D			S29AL008J			M29W800D			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I _{CC1}	Supply Current (read)		9	16		7	12			10	
I _{CC2}	Supply Current (standby)		0.2	5		0.2	5			100	
I _{CC3}	Supply Current (program/erase)		20	35		20	30			20	
V _{IL}	Input Low Voltage	-0.5		0.8	-0.1		0.8	-0.5		0.8	
V _{ID}	Identification Voltage	11.5		12.5	8.5		12.5	11.5		12.5	
V _{LKO}	Program/Erase Lockout Supply Voltage	2.3		2.8	2.1		2.5	1.8		2.3	

AC specifications

AC specification differences are shown here, comparing the fastest versions available at the full voltage range (2.7 V – 3.6 V).

Table 7: AC specification differences

Sym	Alt	Parameter	Test Condition	S29AL008D	S29AL008J	M29W800D	Unit
t_{AVQV}	t_{ACC}	Address to Output Delay	Max	60	70	45	ns
t_{GLQV}	t_{OE}	Output Enable Low to Output Valid	Max	25	30	25	ns
t_{GHQZ}	t_{DF}	Output Enable High to Output Hi-Z	Max	16		20	ns
t_{BLOZ}	t_{FLOZ}	$\overline{\text{BYTE}}$ low to Output Hi-Z	Max	16		25	ns
t_{BHQV}	t_{FHQV}	$\overline{\text{BYTE}}$ High to Output Valid	Max	60	70	30	ns
t_{WLWH}	t_{WP}	Write Enable Low to Write Enable High	Min	35		45	ns
t_{AVAV}	t_{WC}	Address Valid to Next Address Valid	Min	60	70	45	ns
t_{WLWH}	t_{WP}	Write Enable Low to Write Enable High	Min	35		30	ns
t_{WHWL}	t_{WPH}	Write Pulse Width High	Min	30	25	30	ns
t_{DVWH}	t_{DS}	Input Valid to Write Enable High	Min	35		25	ns
t_{WLAX}	t_{AH}	Write Enable Low to Address Transition	Min	45		40	ns
t_{ELEH}	t_{CP}	Chip Enable Low to Chip Enable High	Min	35		30	ns
t_{DVEH}	t_{DS}	Input Valid to Chip Enable High	Min	35		25	ns
t_{WHRL}	t_{BUSY}	Program/Erase Valid to $\overline{\text{RB}}$ Low	Max	90		30	ns

Numonyx™ M29W800D to Spansion S29AL008J/D

Sym	Alt	Parameter	Test Condition	S29AL008D	S29AL008J	M29W800D	Unit
t _{EH} EL	t _{CPH}	Chip Enable High to Chip Enable Low	Min	35		30	ns
t _{PLYH}	t _{READY}	\overline{RP} low to Read Mode	Max	20	35	10	μs

⁽¹⁾ The S29AL008D/J is capable of a faster t_{ACC} of 55ns but is limited to the reduced voltage range of 3.0 V – 3.6 V, while the M29W800D guarantees this access time also for VCC as low as 2.7 V.

Revision history

Table 9. Document revision history

Date	Revision	Changes
20-Feb-2009	1	Initial release
09-Apr-2009	2	Updated Device ID; Table of Contents; Max block/chip erase time

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