



AN309017

Migration Guide

How to Migrate to the Numonyx M29F family from the Spansion* Am29F Family Flash Memory

This application note explains how to migrate an application based on the Spansion*¹ Am29F200B, Am29F400B, Am29F800B, and Am29F160D flash memory devices to an application based on the Numonyx™ M29F family flash memory devices. 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 Automotive M29F memory, manufactured on the mature 110nm technology, ideal for all applications needing a reliable (min 100,000 cycles, 20 years data retention), fast, parallel NOR device (available in 55 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 M29F family can replace many competitors' parts such as select devices from the Spansion Am29F family. Customers that value reliability will benefit from using the M29F family based on single level cell, floating gate technology (100,000 cycles, 20 years retention minimum) with AEC-Q100 qualification and testing.

M29F is offered in either -40C to 85C and in -40 °C to 125 °C extended temperature range. Please refer to the datasheet and contact your local sales for availability of your preferred combination.

†Overall total including different memory densities

Memory architecture and protection groups

The Spansion Am29F and Numonyx M29F memory products can be used in byte (x8) or word (x16) mode. On the Am29F and M29F, any block can be protected independently from the others. The blocks in both these memories are asymmetrically arranged with:

Device Product Code	64Kbytes Block	32Kbytes Block	16Kbytes Block	8Kbytes Block
AM29F160D	31	1	1	2
AM29F800B	15	1	1	2
AM29F400B	7	1	1	2
AM29F200D	3	1	1	2

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

Numonyx™ M29F to Spansion Am29F

Device Product Code	64Kbytes Block	32Kbytes Block	16Kbytes Block	8Kbytes Block
M29F160F	31	1	1	2
M29F800F	15	1	1	2
M29F400F	7	1	1	2
M29F200F	3	1	1	2

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Hardware migration

The 2Mbit/4Mbit/8Mbit devices of either companies are fully aligned in terms of signals and package pin-out, while a difference is present in the 16Mbit version as highlighted in this section, it provides a detailed comparison between AM29F160D and M29F160F signals and package pin-out.

Signal Descriptions

Table 1: Signal description for the AM29F160D and M29F160F devices

Signal Name		Description	Input / Output
AM29F160D	M29F160F		
A0-A19		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#	$\text{R}\overline{\text{B}}$	Ready/Busy Output	Output
VCC		Supply Voltage	Supply
VSS		Ground	
WP#	N/A ¹	Write Protect	Input

(1) M29F does not have a write protect pin.

Packages

The AM29F and the M29F devices are offered in TSOP48 (20mm x 12mm) and SO44 packages. Please contact your local sales for details of availability and price.

The M29F200/400/800F are fully pin-to-pin compatible with the AM29F200/400/800, while the M29F160F and the AM29F160 are also fully aligned, with the exception of the WP# pin. M29F160F does not include the WP# signal which is a NC (no-connect) on the package.

Mechanical specifications are pretty aligned, except for small differences in the SO44 packages.

Software command set

The M29F and Am29F feature an identical set of standard commands.

Table 2: Software commands for the AM29F, and M29F devices

Commands	M29F	AM29F160	AM29F800/400/200
Read/Reset	✓	✓	✓
Autoselect	✓	✓	✓
CFI Query	✓	✓	NA
Program	✓	✓	✓
Unlock Bypass	✓	✓	NA
Unlock Bypass Program	✓	✓	NA
Unlock Bypass Reset	✓	✓	NA
Chip Erase	✓	✓	✓
Block Erase	✓	✓	✓
Erase Suspend	✓	✓	✓
Erase Resume	✓	✓	✓

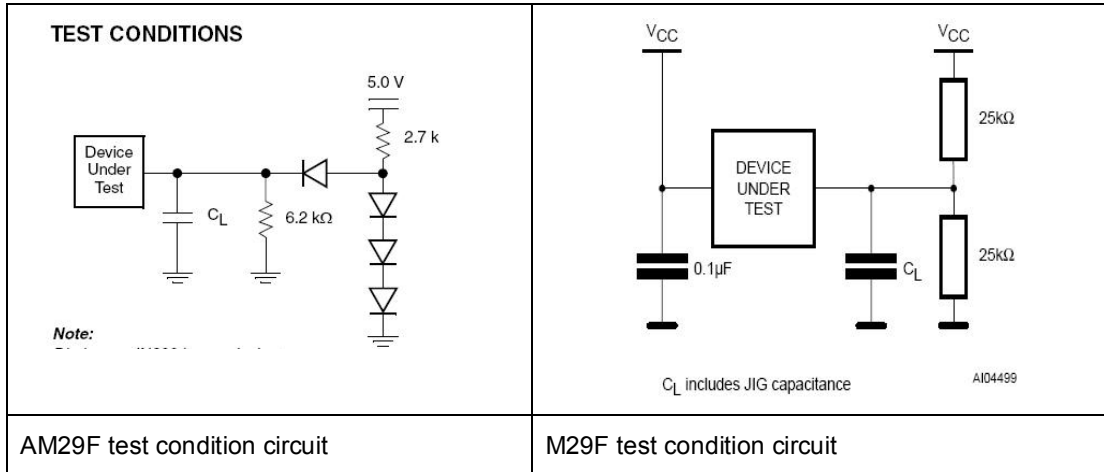
Device codes and auto select codes

The auto select codes are composed of the manufacturer code, the device code and the block protection status. The AM29F and M29F devices have the same manufacturer code and device codes.

The AM29F and M29F devices use identical commands and address inputs to read the auto select codes, as per next table:

Performance and specifications

The M29F and Am29F have almost compatible DC and AC characteristics (see below for details). Please note that the testing platforms which guarantee the DC and AC specifications differ between Spansion and Numonyx:



Access Time

The M29F has a random access time of 55 ns. The AM29F has different access times accordingly to the size and the device product code. The fastest access time is accordingly to the following table:

Device Product Code	Access Time(ns)
AM29F160D	70
AM29F800B	70
AM29F400B	45
AM29F200D	45

Program and Erase Times

Program and erase time differences are shown here.

Table 3: Program and Erase specifications

Parameter	AM29F160D ⁽¹⁾		M29F160F		Unit
	Typ	Max	Typ	Max	
Block Erase	1	8	0.8	6	s
Chip Erase	25		25	120	s
Byte program	7	210	11	200	μs

Numonyx™ M29F to Spansion Am29F

Parameter	AM29F160D ⁽¹⁾		M29F160F		Unit
	Typ	Max	Typ	Max	
Word program	7	210	11	200	s
Chip Program (word)	7.2	21.6	12	60	s
Chip Program (byte)	11	33	24	120	S

(1) Erase Operation Timings are referred to a preprogrammed array, while programming timing are calculated on checkboard pattern

Parameter	AM29F800 ⁽¹⁾		M29F800F		Unit
	Typ	Max	Typ	Max	
Block Erase	1	8	0.8	6	S
Chip Erase	19	152	12	60	S
Byte program	7	300	11	200	μs
Word program	14	600	11	200	S
Chip Program (word)	7.2	21.6	12	60	S
Chip Program (byte)			24	120	S

(1) Erase Operation Timings are referred to a preprogrammed array, while programming timing are calculated on checkboard pattern

Parameter	AM29F400B ⁽¹⁾		M29F400F		Unit
	Typ	Max	Typ	Max	
Block Erase	1	8	0.8	6	s
Chip Erase	11		6	30	s
Byte program	7	300	11	200	μs
Word program	12	500	11	200	s

Numonyx™ M29F to Spansion Am29F

Parameter	AM29F400B ⁽¹⁾		M29F400F		Unit
	Typ	Max	Typ	Max	
Chip Program (word)	3.1	9.3	3	15	s
Chip Program (byte)	3.6	10.8	3	15	S

(1) Erase Operation Timings are referred to a preprogrammed array, while programming timing are calculated on checkboard pattern

Parameter	AM29F200D ⁽¹⁾		M29F200F		Unit
	Typ	Max	Typ	Max	
Block Erase	1	8	0.8	6	S
Chip Erase	5		3	15	S
Byte program	7	300	11	200	μs
Word program	12	500	11	200	S
Chip Program (word)	1.8	5.4	2	8	S
Chip Program (byte)			4		S

(1) Erase Operation Timings are referred to a preprogrammed array, while programming timing are calculated on checkboard pattern

DC specifications

Table 4: DC specifications, AM29F160, AM29F800

Parameter	Description	AM29F160			AM29F800			Unit
		Min	Typ	Max	Min	Typ	Max	
I _{CC1}	Supply Current (read)		15	50(x16)		15	50(x16)	mA
I _{CC2}	Supply Current (standby)		35	50			60	μA
I _{CC3}	Supply Current (program/erase)		0.4	1			1	mA
V _{IL}	Input Low Voltage	-0.5		0.8	-0.5		0.8	V
V _{IH}	Input High Voltage	2.0		V _{CC} +0.5	2.0		V _{CC} +0.5	V
V _{LKO}	Program/Erase Lockout Supply Voltage	3.2		4.2	3.2		4.2	V

Table 5: DC specifications, AM29F400, AM29F200

Parameter	Description	AM29F400			AM29F200			Unit
		Min	Typ	Max	Min	Typ	Max	
I _{CC1}	Supply Current (read)		19	50(x16)			50(x16)	mA
I _{CC2}	Supply Current (standby)		36	60			60	μA
I _{CC3}	Supply Current (program/erase)		0.4	1			1	mA
V _{IL}	Input Low Voltage	-0.5		0.8	-0.5		0.8	V
V _{IH}	Input High Voltage	2.0		V _{CC} +0.5	2.0		V _{CC} +0.5	V
V _{LKO}	Program/Erase Lockout Supply Voltage	3.2		4.2	3.2		4.2	V

Table 6: DC specifications, M29F

Parameter	Description	M29F			Unit
		Min	Typ	Max	
I _{CC1}	Supply Current (read)		4.5	10	mA
I _{CC2}	Supply Current (standby)		35	100	μA
I _{CC3}	Supply Current (program/erase)			20	mA
V _{IL}	Input Low Voltage	-0.5		0.8	V
V _{IH}	Input High Voltage		0.7*V _{CC}	V _{CC} + 0.3	V
V _{LKO}	Program/Erase Lockout Supply Voltage	1.8		2.3	V

Revision history

Table 9. Document revision history

Date	Revision	Changes
6-May-2009	1	Initial release

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