Technical Note

Migrating from Spansion Am29F to Micron M29F NOR Flash Memories

Introduction

This technical note explains the process for migrating an application based on Spansion Am29F200B, Am29F400B, Am29F800B, and Am29F160D Flash devices to an application based on Micron M29F Flash devices. The purpose of this document is not to provide detailed information on the devices, but to highlight the similarities and differences between them. The comparison takes into consideration the signal descriptions, packages, architecture, software command set, performance, block protections, and part number comparision table.

The Micron automotive M29F memory device, manufactured on the mature 110nm technology, is ideal for all applications requiring a reliable, fast, parallel NOR device (available in 55ns access times). Using the industry standard command set, the M29F can replace select devices from the Spansion Am29F family.

The M29F is based on single-level cell, floating gate technology (100,000 cycles, 20 years data retention minimum) with AEC-Q100 qualification and testing and is offered in -40°C to +85°C and -40°C to +125°C extended temperature ranges. Refer to the M29F data sheet for complete details.

Part numbers can be verified at www.micron.com. Feature and specification comparison by device type is available at www.micron.com/products.

Memory Architecture and Protection Groups

The Spansion Am29F and Micron M29F memory devices can be used in byte (x8) or word (x16) mode.

On both devices, any block can be protected independently from the others. The blocks in both devices are asymmetrically arranged, as shown in Table 1.

Table 1: Memory Architecture and Protection Groups

Device Product Code	64KB Block	32KB Block	16KB Block	8KB Block
AM29F160D	31	1	1	2
AM29F800B	15	1	1	2
AM29F400B	7	1	1	2
AM29F200D	3	1	1	2
M29F160F	31	1	1	2
M29F800F	15	1	1	2
M29F400F	7	1	1	2
M29F200F	3	1	1	2

Hardware Migration

The Am29F and M29F devices (2Mb, 4Mb, and 8Mb) are fully aligned in terms of signals and package pin-out, with the exception of the 16Mb version as described in this section.

Table 2 provides a comparison between the Am29F and M29F signals.

Table 2: Signal Descriptions

Am29F Signal	M29F Signal	Type	Description	Notes
A[19:0]		Input	Address inputs	
DQ[14:0]		I/O	Data input/outputs	
DQ15/A_{-1}		I/O	DQ15 (data I/O, word mode), A_{-1} (LSB address, byte mode)	
BYTE#		Input	Byte/word organization select	
CE#	E#	Input	Chip enable	
OE#	G#	Input	Output enable	
WE#	W#	Input	Write enable	
RESET#	RP#	Input	Reset/block temporary unprotect	
RY/BY#	RB#	Output	Ready/busy output	
VCC		Supply	Supply voltage	
VSS		–	Ground	
WP#	N/A	Input	Write protect	1

Note: 1. The M29F device does not have a write protect pin.

Packages

The Am29F and M29F devices are offered in TSOP48 (20mm x 12mm) and SO44 packages. (Note the M29F160F is not available in the SO44 package.) Contact your local sales representative for details on availability and price.

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

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

Software Command Set

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

Table 3: Software Commands

Command	M29F	AM29F160	AM29F800/400/200
READ/RESET	Supported	Supported	Supported
AUTOSELECT			Supported
CFI QUERY			N/A
PROGRAM			Supported
UNLOCK BYPASS			N/A
UNLOCK BYPASS PROGRAM			N/A
UNLOCK BYPASS RESET			N/A
CHIP ERASE			Supported
BLOCK ERASE			Supported
ERASE SUSPEND			Supported
ERASE RESUME			Supported

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 and device codes.

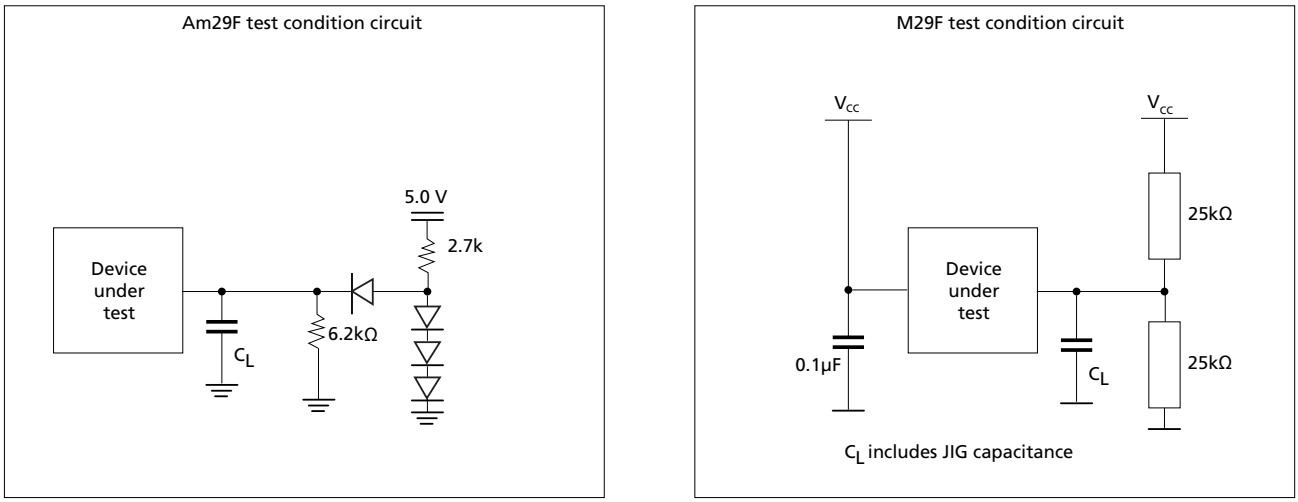
The Am29F and M29F devices use identical commands and address inputs to read the auto select codes.

Performance and Specifications

The Am29F and M29F devices have almost compatible AC and DC characteristics (as described in this section). Note that the testing platforms that guarantee the AC and DC specifications differ between Spansion and Micron.

Test Conditions

Figure 1: Test Conditions



Access Time

The M29F has a random access time of 55ns.

The Am29F has different access times according to the size and device product code. Fastest access times are shown in the following table.

Table 4: Am29F Access Times

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 in the following tables.

Table 5: 16Mb Program and Erase Times

Parameter	M29F160F			Am29F160D[1]			Unit
	Min	Typ	Max	Min	Typ	Max	
Block erase	–	0.8	6	–	1	8	s
Chip erase	–	25	120	–	25	–	s
Byte program	–	11	200	–	7	210	µs
Word program	–	11	200	–	7	210	s
Chip program (word)	–	12	60	–	7.2	21.6	s
Chip program (byte)	–	24	120	–	11	33	s

Note: 1. Erase times are determined by a preprogrammed array, while program times are calculated on a checkboard pattern.

Table 6: 8Mb Program and Erase Times

Parameter	M29F800F			Am29F800[1]			Unit
	Min	Typ	Max	Min	Typ	Max	
Block erase	–	0.8	6	–	1	8	s
Chip erase	–	12	60	–	19	152	s
Byte program	–	11	200	–	7	300	µs
Word program	–	11	200	–	14	600	s
Chip program (word)	–	6	30	–	7.2	21.6	s
Chip program (byte)	–	12	60	–	–	–	s

Note: 1. Erase times are determined by a preprogrammed array, while program times are calculated on a checkboard pattern.

Table 7: 4Mb Program and Erase Times

Parameter	M29F400F			Am29F400B[1]			Unit
	Min	Typ	Max	Min	Typ	Max	
Block erase	–	0.8	6	–	1	8	s
Chip erase	–	6	30	–	11	–	s
Byte program	–	11	200	–	7	300	µs
Word program	–	11	200	–	12	500	s
Chip program (word)	–	3	15	–	3.1	9.3	s
Chip program (byte)	–	6	30	–	3.6	10.8	s

Note: 1. Erase times are determined by a preprogrammed array, while program times are calculated on a checkboard pattern.

Table 8: 2Mb Program and Erase Times

Parameter	M29F200F			AM29F200D[1]			Unit
	Min	Typ	Max	Min	Typ	Max	
Block erase	–	0.8	6	–	1	8	s
Chip erase	–	3	15	–	5	–	s
Byte program	–	11	200	–	7	300	µs
Word program	–	11	200	–	12	500	s
Chip program (word)	–	2	8	–	1.8	5.4	s
Chip program (byte)	–	4	16	–	–	–	s

Note: 1. Erase times are determined by a preprogrammed array, while program times are calculated on a checkboard pattern.

DC Specifications

Table 9: M29F DC Specifications

Symbol	Description	M29F			Unit
		Min	Typ	Max	
I_{CC1}	Supply current (read)	–	7	20	mA
I_{CC2}	Supply current (standby)	–	60	120	µA
I_{CC3}	Supply current (program/erase)	–	–	30	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

Table 10: Am29F160/800 DC Specifications

Symbol	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 11: Am29F400/200 DC Specifications

Symbol	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

Part Numbers

Table 12 lists cross-reference part numbers for the Micron M29F and Spansion Am29F devices.

Table 12: Part Numbers

Micron Part Number	Spansion Part Number	Density	Configuration	Package	Temperature Range[1]	Media	Notes
M29F200FB55M3E2	AM29F200BB-55SE	2Mb	Bottom Boot	SOIC	-40°C to +125°C	Tray	2
M29F200FB55M3F2	AM29F200BB-55SE		Bottom Boot	SOIC	-40°C to +125°C	Tape & Reel	
M29F200FB55N3E2	AM29F200BB-55EE		Bottom Boot	TSOP	-40°C to +125°C	Tray	
M29F200FB55N3F2	AM29F200BB-55EE		Bottom Boot	TSOP	-40°C to +125°C	Tape & Reel	
M29F200FB5AM6F2	AM29F200BB-55SI		Bottom Boot	SOIC	-40°C to +85°C	Tape & Reel	
M29F200FB5AN6E2	AM29F200BB-55EI		Bottom Boot	TSOP	-40°C to +85°C	Tray	
M29F200FT55M3E2	AM29F200BT-55SE		Top Boot	SOIC	-40°C to +125°C	Tray	
M29F200FT55M3F2	AM29F200BT-55SE		Top Boot	SOIC	-40°C to +125°C	Tape & Reel	
M29F200FT55N3E2	AM29F200BT-55EE		Top Boot	TSOP	-40°C to +125°C	Tray	
M29F200FT55N3F2	AM29F200BT-55EE		Top Boot	TSOP	-40°C to +125°C	Tape & Reel	
M29F200FT5AM6F2	AM29F200BT-55SI		Top Boot	SOIC	-40°C to +85°C	Tape & Reel	
M29F200FT5AN6E2	AM29F200BT-55EI		Top Boot	TSOP	-40°C to +85°C	Tray	
M29F200FT5AN6F2	AM29F200BT-55EI		Top Boot	TSOP	-40°C to +85°C	Tape & Reel	
M29F400FB55M3E2	AM29F400BB-55SE	4Mb	Bottom Boot	SOIC	-40°C to +125°C	Tray	
M29F400FB55M3F2	AM29F400BB-55SE		Bottom Boot	SOIC	-40°C to +125°C	Tape & Reel	
M29F400FB55N3E2	AM29F400BB-55EE		Bottom Boot	TSOP	-40°C to +125°C	Tray	
M29F400FB55N3F2	AM29F400BB-55EE		Bottom Boot	TSOP	-40°C to +125°C	Tape & Reel	
M29F400FB5AM6F2	AM29F400BB-55SI		Bottom Boot	SOIC	-40°C to +85°C	Tape & Reel	
M29F400FB5AN6E2	AM29F400BB-55EI		Bottom Boot	TSOP	-40°C to +85°C	Tray	
M29F400FT55M3E2	AM29F400BT-55SE		Top Boot	SOIC	-40°C to +125°C	Tray	
M29F400FT55M3F2	AM29F400BT-55SE		Top Boot	SOIC	-40°C to +125°C	Tape & Reel	
M29F400FT55N3E2	AM29F400BT-55EE		Top Boot	TSOP	-40°C to +125°C	Tray	
M29F400FT55N3F2	AM29F400BT-55EE		Top Boot	TSOP	-40°C to +125°C	Tape & Reel	
M29F400FT5AN6E2	AM29F400BT-55EI		Top Boot	TSOP	-40°C to +85°C	Tray	

Table 12: Part Numbers (Continued)

Micron Part Number	Spansion Part Number	Density	Configuration	Package	Temperature Range[1]	Media	Notes
M29F800FB55M3E2	AM29F800BB-55SE	8Mb	Bottom Boot	SOIC	-40°C to +125°C	Tray	
M29F800FB55M3F2	AM29F800BB-55SE		Bottom Boot	SOIC	-40°C to +125°C	Tape & Reel	
M29F800FB55N3E2	AM29F800BB-55EE		Bottom Boot	TSOP	-40°C to +125°C	Tray	
M29F800FB55N3F2	AM29F800BB-55EE		Bottom Boot	TSOP	-40°C to +125°C	Tape & Reel	
M29F800FB5AM6F2	AM29F800BB-55SI		Bottom Boot	SOIC	-40°C to +85°C	Tape & Reel	
M29F800FB5AN6E2	AM29F800BB-55EI		Bottom Boot	TSOP	-40°C to +85°C	Tray	
M29F800FB5AN6F2	AM29F800BB-55EI		Bottom Boot	TSOP	-40°C to +85°C	Tape & Reel	
M29F800FT55M3E2	AM29F800BT-55SE		Top Boot	SOIC	-40°C to +125°C	Tray	
M29F800FT55M3F2	AM29F800BT-55SE		Top Boot	SOIC	-40°C to +125°C	Tape & Reel	
M29F800FT55N3E2	AM29F800BT-55EE		Top Boot	TSOP	-40°C to +125°C	Tray	
M29F800FT55N3F2	AM29F800BT-55EE		Top Boot	TSOP	-40°C to +125°C	Tape & Reel	
M29F800FT5AM6F2	AM29F800BT-55SI		Top Boot	SOIC	-40°C to +85°C	Tape & Reel	
M29F800FT5AN6E2	AM29F800BT-55EI		Top Boot	TSOP	-40°C to +85°C	Tray	
M29F800FT5AN6F2	AM29F800BT-55EI		Top Boot	TSOP	-40°C to +85°C	Tape & Reel	
M29F160FB55N3E2	AM29F160DB75EE	16Mb	Bottom Boot	TSOP	-40°C to +125°C	Tray	3, 4
M29F160FB55N3F2	AM29F160DB75EE		Bottom Boot	TSOP	-40°C to +125°C	Tape & Reel	
M29F160FB5AN6E2	AM29F160DB70EI		Bottom Boot	TSOP	-40°C to +85°C	Tray	4
M29F160FB5AN6F2	AM29F160DB70EI		Bottom Boot	TSOP	-40°C to +85°C	Tape & Reel	
M29F160FT55N3E2	AM29F160DT75EE		Top Boot	TSOP	-40°C to +125°C	Tray	3, 4
M29F160FT55N3F2	AM29F160DT75EE		Top Boot	TSOP	-40°C to +125°C	Tape & Reel	
M29F160FT5AN6E2	AM29F160DT70EI		Top Boot	TSOP	-40°C to +85°C	Tray	4
M29F160FT5AN6F2	AM29F160DT70EI		Top Boot	TSOP	-40°C to +85°C	Tape & Reel	

Notes:
1. The extended temperature range for Spansion devices is -55°C to +125°C.
2. Out of production for Spansion.
3. Extended temperature range is -40°C to +110°C for Spansion devices.
4. The available speed option for Spansion devices is 70ns or 90ns.

Revision History

Rev. A – 02/13

- Initial release

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