Technical Note

Comparing Micron N25Q and M25PX Flash Devices

Introduction

The purpose of this technical note is to compare features of the Micron® N25Q serial-Flash family and M25PX Flash memory devices. Features compared include memory architecture, package options, signal descriptions, command sets, electrical specifications, and device identification.

Memory Array Architecture

N25Q Features	M25PX Features
Program 1 to 256 bytes	Program 1 to 256 bytes
Uniform sector erase (64KB)	Uniform sector erase (64KB)
Uniform subsector erase (4KB)	Uniform subsector erase (4KB)

Package Configurations

Table 1: Package Configurations

Package	N25Q		M25PX	
	32Mb	64Mb	32Mb	64Mb
VDFPN8 (8mm x 6mm MLP8)	Yes	Yes	Yes	Yes
TBGA24 (6mm x 8mm)	Yes	Yes	Yes	Yes
VFDFPN8 (6mm x 5mm MLP)	Yes	Yes	Yes	–
SO16 (300 mils body width)	Yes	Yes	Yes	Yes
SO8W (SO8 208 mils body width)	Yes	Yes	Yes	–
UFDFPN8 (4mm x 3mm MLP)	Yes	–	–	–
SO8N (SO8 150 mils body width)	Yes	–	–	–

Note: 1. The M25PX does not have package options for 128Mb or 256Mb devices. Refer to the N25Q data sheet for N25Q package options in 128Mb and 256Mb devices.

Signal Descriptions

Table 2: Signal Descriptions

N25Q Signal	M25PX Signal	Type	Description
C	C	Input	Serial clock
DQ0	DQ0	Input or I/O	Serial data input or I/O
DQ1	DQ1	Output or I/O	Serial data output or I/O
S#	S#	Input	Chip select
W/V_{PP}/DQ2	W/V_{PP}	Input or I/O	Write protect/enhanced program supply voltage or I/O
HOLD#/DQ3	HOLD#	Input or I/O	HOLD or I/O
V_{CC}	V_{CC}	Input	Supply voltage
V_{SS}	V_{SS}	Input	Ground

Note: 1. M25PX does not support quad I/O functionality.

Commands

Table 3: Supported Command Set

Command Name	Command Code (Setup/Confirm) N25Q	Command Code (Setup/Confirm) M25PX	Notes
READ			
READ	03h	03h	
FAST READ	0Bh	0Bh	
DUAL OUTPUT FAST READ	3Bh	3Bh	
DUAL INPUT/OUTPUT FAST READ	BBh	N/A	1
QUAD OUTPUT FAST READ	6Bh	N/A	1
QUAD INPUT/OUTPUT FAST READ	EBh	N/A	1
READ DEVICE ID	9Fh/9Eh	9Fh/9Eh	
PROGRAM			
PAGE PROGRAM	02h	02h	
DUAL INPUT FAST PROGRAM	A2h	A2h	
QUAD INPUT FAST PROGRAM	32h	N/A	1
ERASE			
BULK ERASE	C7h	C7h	
SECTOR ERASE – 64KB	D8h	D8h	
SUBSECTOR ERASE – 4KB	20h	20h	
SUSPEND			
PROGRAM/ERASE SUSPEND	75h	N/A	1
PROGRAM/ERASE RESUME	7Ah	N/A	1
DEEP POWER-DOWN			
DEEP POWER-DOWN	B9h	B9h	2
RELEASE FROM DEEP POWER-DOWN	ABh	ABh	2

Notes:
1. Not supported on the M25PX.
2. The deep power-down mode for the N25Q is available only in the 1.8V device.

READ Commands

The READ command set for the N25Q and M25PX devices is identical, and each device follows the standard three address byte protocol.

The M25PX does not support any I/O reads or any quad read commands.

PROGRAM Commands

The M25PX does not support quad input fast programming. The N25Q requires VECR or NVCR to enable quad I/O functionality. With NVCR set (bit 3 = 0), the device can be powered up or down with quad I/O functionality.

Electrical Characteristics

Table 4: DC Current Specifications

Parameter	Symbol	N25Q		M25PX		Units
		Min	Max	Min	Max	
Standby current	I_{CC1}	–	100	–	50	µA
Operating current (FAST READ, DUAL I/O, or QUAD I/O)	I_{CC3}	–	20	–	15	mA
Operating current (PAGE PROGRAM)	I_{CC4}	–	20	–	15	mA
Operating current (WRITE STATUS REGISTER)	I_{CC5}	–	20	–	15	mA
Operating current (ERASE)	I_{CC6}	–	20	–	15	mA

Table 5: DC Voltage Specifications

Parameter	Symbol	N25Q		M25PX		Units
		Min	Max	Min	Max	
Input low voltage	V_{IL}	–0.5	0.3 V_{CC}	–0.5	0.3 V_{CC}	V
Input high voltage	V_{IH}	0.7 V_{CC}	V_{CC} + 0.4	0.7 V_{CC}	V_{CC} + 0.4	V
Output low voltage	V_{OL}	–	0.4	–	0.4	V
Output high voltage	V_{OH}	V_{CC} - 0.2	–	V_{CC} - 0.2	–	V

AC Characteristics

Table 6: AC Specifications

Parameter	Symbol	Alternate Symbol	N25Q		M25PX		Units
			Min	Max	Min	Max	
Clock frequency (FAST READ)	^{f}C	^{f}C	–	108	–	75	MHz
Clock frequency (READ)	^{f}R	^{f}R	–	54	–	33	MHz
S# active setup time	$^{t}SLCH$	^{t}CSS	4	–	5	–	ns
Data-in setup time	$^{t}DVCH$	^{t}DSU	2	–	2	–	ns
Data-in hold time	$^{t}CHDX$	^{t}DH	3	–	5	–	ns
S# deselect time after correct READ (ARRAY READ to ARRAY READ)	$^{t}SHSL$	^{t}CSH	20	–	80	–	ns
S# deselect time after incorrect READ or different instruction (ERASE/PROGRAM to READ)	$^{t}SHSL$	^{t}CSH	50	–	80	–	ns
Output disable time (2.7–3.6V)	$^{t}SHQZ$	^{t}DIS	–	8	–	8	ns
Clock low to output valid (30pF)	$^{t}CLQV$	^{t}V	–	7	–	8	ns
Output hold time	$^{t}CLQX$	^{t}HO	1	–	0	–	ns
HOLD to output Low-Z	$^{t}HHQX$	^{t}LZ	–	8	–	8	ns
HOLD to output High-Z	$^{t}HLQZ$	^{t}HZ	–	8	–	8	ns

Note: 1. AC specifications compare the fastest versions available at the full voltage range (2.7–3.6V).

Program and Erase Specifications

Table 7: Program and Erase Specifications

Operation	N25Q		M25PX		Unit
	Typ	Max	Typ	Max	
PAGE PROGRAM (256 bytes)	0.5	5	0.8	5	ms
SUBSECTOR ERASE (4KB)	0.3	3	0.07	0.15	s
SECTOR ERASE (64KB)	0.7	3	0.7	3	s
BULK ERASE (128Mb)	170	250	N/A	N/A	s
BULK ERASE (64Mb)	60	120	68	160	s
BULK ERASE (32Mb)	30	60	34	80	s
BULK ERASE (16Mb)	N/A	N/A	15	80	s
BULK ERASE (8Mb)	N/A	N/A	8	80	s

Configuration and Memory Map

Table 8: Sectors and Subsectors by Density

Density		Sector	Subsector	Address Range	
64		127	2047	7FFFFFh	7FF000h
			:	:	:
			2032	7F0FFFh	7F0000h
		:	:	:	:
	32	63	1023	3FFFFFh	3FF000h
			:	:	:
			1008	3F0FFFh	3F0000h
		:	:	:	:
		0	15	0FFFFh	0F000h
			:	:	:
			4	04FFFh	04000h
			3	03FFFh	03000h
			2	02FFFh	02000h
			1	01FFFh	01000h
			0	00FFFh	00000h

Device Identification

Manufacturer identification is assigned by JEDEC. As a result, the N25Q and M25PX devices have the same manufacturer ID, but different memory type codes. The memory capacity code varies by density. Command 9Fh is used to read these codes in both devices.

Table 9: Read Identification Summary

Parameter	N25Q Code	M25PX Code
Manufacturer ID	20h	20h
Memory type	BAh	71h
Memory capacity (128Mb)	18h	N/A
Memory capacity (64Mb)	17h	17h
Memory capacity (32Mb)	16h	16h
Memory capacity (16Mb)	N/A	15h
Memory capacity (8Mb)	N/A	14h

Table 10: UID

	UID		
	EDID + CDF length	EDID	CFD
N25Q	10h	2 bytes	14 bytes (factory programmed)
M25PX	10h	16 bytes (factory programmed with customer requests)	

Refer to the N25Q data sheet for more information about UID, EDID, and CFD.

Part Number Cross-Reference

N25Q Part Number	M25PX Part Number	Notes
N25Q032A13ESF40G	M25PX32-VMF6E	
N25Q032A13ESF40F	M25PX32-VMF6F	
N25Q032A13EF640E	M25PX32-VMP6E	
N25Q032A13EF640F	M25PX32-VMP6F	
N25Q032A13ESE40G	M25PX32-VMW6E	
N25Q032A13ESE40F	M25PX32-VMW6F	
N25Q032A13E1241E	M25PX32-VZM6E	
N25Q032A13E1241F	M25PX32-VZM6F	
N25Q032A13ESC40	N/A	SO8N is availble only on N25Q032
N25Q032A13EF440	N/A	MLP 4 x 3 available only on N25Q032
N25Q064A13ESF40G	M25PX64S-VMF6P	
N25Q064A13ESF40F	M25PX64S-VMF6TP	
N25Q064A13EF840E	M25PX64-VMD6G	Check data sheet package dimension
N25Q064A13EF840F	M25PX64-VMD6TG	Check data sheet package dimension
N25Q064A13EF840E	M25PX64-VME6G	
N25Q064A13EF840F	M25PX64-VME6TG	
N25Q064A13ESF40G	M25PX64-VMF6P	
N25Q064A13ESF40F	M25PX64-VMF6TP	
N25Q064A13E1241E	M25PX64-VZM6P	
N25Q064A13E1241F	M25PX64-VZM6TP	
N25Q064A13ESE40	N/A	SO8W is availble only on N25Q064
N25Q064A13EF640	N/A	MLP 6 x 5 is availble only on N25Q064

Conclusion

Comparing the features of the Micron N25Q and M25PX Flash memory devices enables users to migrate applications from the M25PX to the N25Q.

Revision History

Rev. C – 6/12

- Updated M25PX SUBSECTOR ERASE values (TYP and Max) and BULK ERASE descriptions in Table 7, Program and Erase Specifications

Rev. B – 11/10

- Added 32Mb, 64Mb, 128Mb, and 256Mb information

Rev. A – 2/10

- Initial release

8000 S. Federal Way, P.O. Box 6, Boise, ID 83707-0006, Tel: 208-368-3900
www.micron.com/productsupport Customer Comment Line: 800-932-4992