

# Technical Note

## Comparing Micron N25Q and M25P Flash Devices

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### Introduction

The purpose of this technical note is to compare features of the Micron<sup>®</sup> N25Q serial-Flash family and M25P Flash memory devices. Features compared include memory architecture, package options, signal descriptions, command sets, electrical specifications, and device identification.



## Memory Array Architecture

N25Q Features	M25P Features
Program 1 to 256 bytes	Program 1 to 256 bytes
Uniform sector erase (64KB)	Uniform sector erase: 32KB for 512Kb to 1Mb devices 64KB for 2Mb to 64Mb devices 256KB for 128Mb devices
Uniform subsector erase (4KB)	

## Package Configurations

Table 1: Package Configurations

Package	N25Q				M25P			
	32Mb	64Mb	128Mb	256Mb	32Mb	64Mb	128Mb	256Mb
VDFPN8 (8mm x 6mm MLP8)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A
TBGA24 (6mm x 8mm)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A
VDFPN8 (6mm x 5mm MLP)	Yes	Yes	Yes	–	Yes	–	N/A	N/A
SO16 (300 mils body width)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A
SO8W (SO8 208 mils body width)	Yes	Yes	Yes	–	Yes	–	N/A	N/A
UDFPN8 (4mm x 3mm MLP)	Yes	–	–	–	–	–	N/A	N/A
SO8N (SO8 150 mil body width)	Yes	–	–	–	–	–	N/A	N/A

## Signal Descriptions

Table 2: Signal Descriptions

N25Q Signal	M25P Signal	Type	Description
C	C	Input	Serial clock
DQ0	D	Input or I/O	Serial data input or I/O
DQ1	Q	Output or I/O	Serial data output or I/O
S#	S#	Input	Chip select
W/V <sub>pp</sub> /DQ2	W/V <sub>pp</sub>	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 <sub>cc</sub>	V <sub>cc</sub>	Input	Supply voltage
V <sub>ss</sub>	V <sub>ss</sub>	Input	Ground

Note: 1. M25P does not support dual or quad I/O functionality.

## Commands

**Table 3: Supported Command Set**

Command Name	Command Code (Setup/Confirm) N25Q	Command Code (Setup/Confirm) M25P	Notes
<b>READ</b>			
READ	03h	03h	
FAST READ	0Bh	0Bh	
DUAL OUTPUT FAST READ	3Bh	N/A	1
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	2
<b>PROGRAM</b>			
PAGE PROGRAM	02h	02h	
DUAL INPUT FAST PROGRAM	A2h	N/A	1
QUAD INPUT FAST PROGRAM	32h	N/A	1
<b>ERASE</b>			
BULK ERASE	C7h	C7h	
SECTOR ERASE – 64KB or 256KB	D8h	D8h	
SUBSECTOR ERASE – 4KB	20h	N/A	1
<b>SUSPEND</b>			
PROGRAM/ERASE SUSPEND	75h	N/A	1
PROGRAM/ERASE RESUME	7Ah	N/A	1
<b>DEEP POWER-DOWN</b>			
DEEP POWER-DOWN	B9h	B9h	3, 4
RELEASE FROM DEEP POWER-DOWN	ABh	ABh	3, 4

- Notes:
1. Not supported on the M25P.
  2. 9Eh not supported on the M25P.
  3. The deep power-down mode for the N25Q is available only in the 1.8V device.
  4. Available on M25P but only part numbers M25P64 and M25P128.

### READ Commands

The READ command set for the N25Q and M25P devices is identical, and each device follows the standard three address byte protocol.

The M25P does not support I/O reads or dual or quad read commands.

### PROGRAM Commands

The M25P does not support dual or 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 Characteristics

Parameter	Symbol	N25Q		M25P		Units
		Min	Max	Min	Max	
Standby current	$I_{CC1}$	–	100	–	100	$\mu\text{A}$
Operating current (FAST READ, DUAL I/O, or QUAD I/O)	$I_{CC3}$	–	20	–	8	mA
Operating current (PAGE PROGRAM)	$I_{CC4}$	–	20	–	15	mA
Operating current (ERASE)	$I_{CC6}$	–	20	–	20	mA

Table 5: DC Voltage Specifications

Parameter	Symbol	N25Q		M25P		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	$V_{IH}$	$0.7 V_{CC}$	$V_{CC} + 0.4$	$0.7 V_{CC}$	$V_{CC} + 0.2$	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		M25P		Units
			Min	Max	Min	Max	
Clock frequency (FAST READ)	f <sub>C</sub>	f <sub>C</sub>	–	108	–	50	MHz
Clock frequency (READ)	f <sub>R</sub>	f <sub>R</sub>	–	54	–	20	MHz
S# active setup time	t <sup>SLCH</sup>	t <sup>CSS</sup>	4	–	5	–	ns
Data-in setup time	t <sup>DVCH</sup>	t <sup>DSU</sup>	2	–	2	–	ns
Data-in hold time	t <sup>CHDX</sup>	t <sup>DH</sup>	3	–	5	–	ns
S# deselect time after correct READ (ARRAY READ to ARRAY READ)	t <sup>SHSL</sup>	t <sup>CSH</sup>	20	–	100	–	ns
S# deselect time after incorrect READ or different instruction (ERASE/PROGRAM to READ)	t <sup>SHSL</sup>	t <sup>CSH</sup>	50	–	100	–	ns
Output disable time	t <sup>SHQZ</sup>	t <sup>DIS</sup>	–	8	–	8	ns
Clock low to output valid (30pF)	t <sup>CLQV</sup>	t <sup>V</sup>	–	7	–	8	ns
Output hold time	t <sup>CLQX</sup>	t <sup>HO</sup>	1	–	0	–	ns
HOLD to output Low-Z	t <sup>HHQX</sup>	t <sup>LZ</sup>	–	8	–	8	ns
HOLD to output High-Z	t <sup>HLQZ</sup>	t <sup>HZ</sup>	–	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		M25P		Unit
	Typ	Max	Typ	Max	
PAGE PROGRAM (256 bytes)	0.5	5	1.4	5	ms
SUBSECTOR ERASE (4KB)	0.3	3	N/A	N/A	s
SECTOR ERASE (64KB)	0.7	3	1	3	s
SECTOR ERASE (256KB)	N/A	N/A	2	6	s
BULK ERASE (128MB)	170	250	105	250	s
BULK ERASE (64MB)	60	120	68	160	s
BULK ERASE (32MB)	30	60	23	80	s
BULK ERASE (16MB)	N/A	N/A	13	40	s
BULK ERASE (8MB)	N/A	N/A	8	20	s
BULK ERASE (4MB)	N/A	N/A	2.5	6	s
BULK ERASE (2MB)	N/A	N/A	2.5	6	s
BULK ERASE (1MB)	N/A	N/A	1.7	6	s
BULK ERASE (512KB)	N/A	N/A	0.85	6	s

## Configuration and Memory Map

**Table 8: Sectors and Subsectors by Density**

Density		Sector	Subsector	Address Range			
64		127	2047	7FFFFh	7F000h		
			:	:	:		
			2032	7F0FFFh	7F0000h		
	32		63	1023	3FFFFh	3F000h	
				:	:	:	
				1008	3F0FFFh	3F0000h	
		0		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 M25P 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	M25P Code
Manufacturer ID	20h	20h
Memory type	BAh	20h
Memory capacity (128Mb)	18h	18h
Memory capacity (64Mb)	17h	17h
Memory capacity (32Mb)	16h	16h
Memory capacity (16Mb)	N/A	15h
Memory capacity (8Mb)	N/A	14h
Memory capacity (4Mb)	N/A	13h
Memory capacity (2Mb)	N/A	12h
Memory capacity (1Mb)	N/A	11h
Memory capacity (512Kb)	N/A	10h



**Table 10: UID**

	UID		
	EDID + CDF length	EDID	CFD
N25Q	10h	2 bytes	14 bytes (factory programmed)
N25PX <sup>1</sup>	10h	16 bytes (factory programmed with customer requests)	

Note: 1. Doesn't apply to part numbers M25P05, M25P10, and M25P128.

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

## Part Number Cross-Reference

N25Q Part Number	M25P Part Number	Notes
N25Q032A13EF840E	M25P32-VME6G	
N25Q032A13EF840F	M25P32-VME6TG	
N25Q032A13ESF40G	M25P32-VMF6P	
N25Q032A13ESF40F	M25P32-VMF6TP	
N25Q032A13EF640E	M25P32-VMP6G	
N25Q032A13EF640F	M25P32-VMP6TG	
N25Q032A13ESE40G	M25P32-VMW6G	
N25Q032A13ESE40F	M25P32-VMW6TG	
N25Q032A13ESC40	N/A	SO8N is available only on N25Q032
N25Q032A13EF440	N/A	MLP 4 x 3 available only on N25Q032
N25Q064A13ESF40G	M25P64S-VMF6P	
N25Q064A13ESF40F	M25P64S-VMF6TP	
N25Q064A13EF840E	M25P64-VME6G	
N25Q064A13EF840F	M25P64-VME6TG	
N25Q064A13ESF40G	M25P64-VMF6P	
N25Q064A13ESF40F	M25P64-VMF6TP	
N25Q064A13ESF40F	M25P64-VMF6TP	
N25Q064A13ESF40F	M25P64-VMF6TP	
N25Q064A13ESF40F	M25P64-VMF6TP	
N25Q064A13ESF40F	M25P64-VMF6TP	
N25Q064A13ESF40F	M25P64-VMF6TP	
N25Q064A13ESF40F	M25P64-VMF6TP	
N25Q064A13ESE40	N/A	SO8W is available only on N25Q064
N25Q064A13EF640	N/A	MLP 6 x 5 is available only on N25Q064
N25Q128A13BF840E	M25P128-VME6GB	
N25Q128A13BF840F	M25P128-VME6TGB	
N25Q128A13BSF40G	M25P128-VMF6PB	
N25Q128A13BSF40F	M25P128-VMF6TPB	
N25Q128A13BF840E	M25P128-VME6G	



## TN-12-12: Comparing N25Q and M25P Flash Devices Conclusion

N25Q Part Number	M25P Part Number	Notes
N25Q128A13BF840F	M25P128-VME6TG	
N25Q128A13BSF40G	M25P128-VMF6P	
N25Q128A13BSF40F	M25P128-VMF6TP	
N25Q128A13BSE40	N/A	

### Conclusion

Comparing the features of the Micron N25Q and M25P Flash memory devices enables users to migrate applications from the M25P to the N25Q.



## **Revision History**

### **Rev. B – 11/10**

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

### **Rev. A – 2/10**

- Initial release

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