

# Technical Note

## Migrating from Micron M25P to Micron MT25Q 128Mb

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### Introduction

The purpose of this technical note is to compare the features of Micron® M25P Flash memory devices with the Micron® MT25QL128 Flash memory devices. The feature comparisons on memory architecture, package options, signal descriptions, command set, electrical specifications, and device identification are described.

This document is written based on the device information available at publication time. In case of inconsistency, information contained in the relevant data sheet supersedes the information in this technical note. This technical note does not provide detailed device information. The standard density specific device data sheet provides a complete description of device functionality, operating modes, and specifications.

## General Features

**Table 1: Comparison of Features**

Features	M25P	MT25QL128
Densities	0.5Mb–128Mb	128Mb
Program	1 to 256 bytes	1 to 256 bytes
Sector architecture	Uniform sector: <ul style="list-style-type: none"> <li>• 512Kb and 1Mb: 32KB</li> <li>• 2Mb–32Mb: 64KB</li> <li>• 128Mb: 256KB</li> </ul>	Uniform sector: 64KB
Subsector	–	Uniform subsector: 4KB, 32KB
Endurance	100,000 cycle	100,000 cycle
Retention	20 years	20 years
V <sub>CC</sub> range	512Kb–4Mb: 2.3V to 3.6V 8Mb and larger devices: 2.7V to 3.6V	2.7V to 3.6V
Industrial temperature range	–40 to +85°C	–40 to +85°C



## Package Configurations

Table 2: Package Configurations

Package	Short Name	M25P									MT25Q
		512Kb	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb	128Mb	128Mb
8-pin SOP2, 150 mil	SO8N	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
8-pin SOP2, 208 mil	SO8W	No	No	No	No	Yes	Yes	Yes	No	No	Yes
16-pin SOP2, 300 mil	SO16W	No	No	No	No	No	Yes	No	Yes	Yes	Yes
U-PDFN-8/2x3	DFN/2x3	No	Yes	No	Yes	No	No	No	No	No	No
U-PDFN-8/4x3	DFN/4x3	No	No	No	No	Yes	Yes	No	No	No	No
24-ball T-PBGA, 05/6mm x 8mm (5 x 5 array)	T-PBGA24	No	No	No	No	No	Yes	No	No	No	Yes
W-PDFN-8 6mm x 5mm (MLP8 6mm x 5mm)	WDFN/6x5 <sup>1</sup>	No	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
W-PDFN-8 8mm x 6mm (MLP8 8mm x 6mm)	WDFN/8x6 <sup>1</sup>	No	No	No	No	No	Yes	No	Yes	Yes	Yes

Note: 1. DFN solutions for M25P and MT25Q are compatible in terms of land pattern.

## Signal Descriptions

M25P	MT25QL128	Type	Description
S#	S#	Input	Chip select
C	C	Input	Serial clock
DQ0	DQ0	Input or I/O	M25P: Serial data input, MT25Q: I/O
DQ1	DQ1	Output or I/O	M25P: Serial data output, MT25Q: I/O
W#/V <sub>PP</sub>	W#/DQ2	Input or I/O	M25P: Write protect and enhanced program supply voltage, MT25Q: Write protect and I/O
HOLD#	HOLD#/DQ3	Input	M25P: HOLD, MT25Q: HOLD or I/O
–	RESET# <sup>2</sup>	Input	Reset
V <sub>CC</sub>	V <sub>CC</sub>	Supply	Power supply
V <sub>SS</sub>	V <sub>SS</sub>	Supply	Ground

- Notes:
1. M25P devices do not support dual or quad I/O functionality.
  2. A dedicated reset pin is available on MT25QL128 for T-PBGA24 and SO16W packages. This signal has an internal pullup resistor and may be left unconnected if not used.



## Commands

Table 3: Command Set

Command	Command Code		Notes
	M25P	MT25QL128	
<b>WRITE Operations</b>			
WRITE ENABLE	06h	06h	
WRITE DISABLE	04h	04h	
<b>READ ID Operation</b>			
READ DEVICE ID	9Fh	9Fh/9Eh	1
<b>STATUS REGISTER Operations</b>			
READ STATUS REGISTER	05h	05h	
WRITE STATUS REGISTER	01h	01h	
<b>READ Operations</b>			
READ	03h	03h	
FAST READ	0Bh	0Bh	
<b>PROGRAM Operation</b>			
PAGE PROGRAM	02h	02h	
<b>ERASE Operations</b>			
BULK ERASE	C7h	C7h/60h	2
SECTOR ERASE	D8h	D8h	
<b>DEEP POWER DOWN Operations</b>			
ENTER DEEP POWER DOWN	B9h	B9h	3
RELEASE FROM DEEP POWER DOWN	ABh	ABh	3

- Notes:
1. 9Eh is not supported on the M25P.
  2. 60h is not supported on the M25P.
  3. ENTER DEEP POWER DOWN command and RELEASE FROM DEEP POWER DOWN command are not supported on M25P128.

## Electrical Characteristics

**Table 4: DC Characteristics**

Parameter	Symbol	M25P		MT25QL128		Units
		Typ	Max	Typ	Max	
Standby current	$I_{CC1}$	–	M25P128: 100 $\mu$ A Others: 50 $\mu$ A	15	50	$\mu$ A
Deep power-down current	$I_{CC2}$	–	512Kb–2Mb devices: 5 $\mu$ A 4Mb–32Mb: 10 $\mu$ A M25P128: N/A	5	30	$\mu$ A
Operating current (READ) at maximum frequency	$I_{CC3}$	–	M25P128: 6mA Others: 8mA	–	16 mA at 133 MHz 8mA at 54 MHz	mA
Operating current (PAGE PROGRAM)	$I_{CC4}$	–	M25P128: 20mA Others: 15mA	–	35	mA
Operating current (ERASE)	$I_{CC6}$	–	M25P128: 20mA Others: 15mA	–	35	mA

**Table 5: DC Voltage Specifications**

Parameter	Symbol	M25P		MT25QL128		Units
		Min	Max	Min	Max	
Input LOW voltage	$V_{IL}$	–0.5	$0.3 \times V_{CC}$	–0.5	$0.3 \times V_{CC}$	V
Input HIGH voltage	$V_{IH}$	$0.7 \times V_{CC}$	$0.2 + V_{CC}$	$0.7 \times V_{CC}$	$0.4 + V_{CC}$	V
Output LOW voltage <sup>1</sup>	$V_{OL}$	–	0.4	–	0.4	V
Output HIGH voltage <sup>2</sup>	$V_{HH}$	$V_{CC} - 0.2$	–	$V_{CC} - 0.2$	–	V

- Notes: 1. Test condition:  $I_{OL} = 1.6\text{mA}$ .  
2. Test condition:  $I_{OH} = -100\mu\text{A}$ .

**Table 6: AC Specifications**

Parameter	Symbol	M25P		MT25QL128	
		Min	Max	Min	Max
Clock frequency (FAST READ)	$f_C$	DC	512Kb–1Mb: 50 MHz 2Mb–32Mb: 75 MHz M25P128: 54 MHz	DC	133 MHz
Clock frequency (READ commands)	$f_R$	DC	512Kb–1Mb: 25 MHz 2Mb–32Mb: 33 MHz M25P128: 54 MHz	DC	54 MHz



**Table 7: Program and Erase Specifications**

Parameter	Symbol	M25P		MT25QL128		Units
		Typ	Max	Typ	Max	
PAGE PROGRAM (256 bytes)	t <sub>PP</sub>	512Kb–1Mb:1.4 2Mb–4Mb: 0.8 2Mb–32Mb: 0.64 M25P128: 0.5	5	0.12	2.8	ms
64KB SECTOR ERASE <sup>1</sup>	t <sub>SE</sub>	0.6	3	0.15	1	s
32KB SECTOR ERASE <sup>2</sup>	t <sub>SE</sub>	0.65	3			s
256KB SECTOR ERASE <sup>3</sup>	t <sub>SE</sub>	1.6	6			s
4KB SUBSECTOR ERASE	t <sub>SSE</sub>			0.05	0.4	s
32KB SUBSECTOR ERASE	t <sub>SSE</sub>			0.1	1	s
512Kb BULK ERASE	t <sub>BE</sub>	0.85	6			s
1Mb BULK ERASE	t <sub>BE</sub>	1.7	6			s
2Mb BULK ERASE	t <sub>BE</sub>	2.5	6			s
4Mb BULK ERASE	t <sub>BE</sub>	4.5	10			s
8Mb BULK ERASE	t <sub>BE</sub>	8	20			s
16Mb BULK ERASE	t <sub>BE</sub>	13	40			s
32Mb BULK ERASE	t <sub>BE</sub>	23	80			s
64Mb BULK ERASE	t <sub>BE</sub>	68	160			s
128Mb BULK ERASE	t <sub>BE</sub>	130	250	38	144	s

- Notes: 1. 64KB sectorisation applies to 2Mb–64Mb M25P devices and to MT25QL128.  
 2. 32KB sectorisation applies to 512Kb–1Mb M25P devices.  
 3. 256KB sectorisation applies to M25P128.



## Device identification

**Table 8: Read Identification Summary**

Parameter		M25P	MT25QL128
Manufacturer ID		20h	20h
Memory type		20h	BAh
Memory capacity	512kb	10h	N/A
	1Mb	11h	
	2Mb	12h	
	4Mb	13h	
	8Mb	14h	
	16Mb	15h	
	32Mb	16h	
	64Mb	17h	
	128Mb	18h	18h
<b>UID</b>			
Extended device ID (EDID) + Customized factory data (CFD) length		N/A <sup>1</sup>	10h <sup>2</sup>
EDID + Device configuration information			2 byte
CFD			14 bytes (factory programmed)

- Notes:
1. UID is not available for M25P05, M25P10, and M25P128 devices, and is optional for other M25P.
  2. Refer to the MT25QL128 data sheet for more information about the UID, EDID, and CFD.



## Part Numbers

**Table 9: Cross-Reference Part Numbers**

<b>M25P Part Number</b>	<b>MT25QL128 Part Number</b>	<b>Density</b>	<b>Package</b>
M25P40-VMP6xGB	MT25QL128ABA1EW7-0SIT	4Mb	DFN/6x5
M25P80-VMW6xG	MT25QL128ABA1ESE-0SIT	8Mb	SO8W
M25P80-VMP6xG	MT25QL128ABA1EW7-0SIT	8Mb	DFN/6x5
M25P16-VMW6xG	MT25QL128ABA1ESE-0SIT	16Mb	SO8W
M25P16-VMP6xG	MT25QL128ABA1EW7-0SIT	16Mb	DFN/6x5
M25P16-VMF6xP	MT25QL128ABA8ESF-0SIT	16Mb	SO16W
M25P16-VME6TG	MT25QL128ABA1EW9-0SIT	16Mb	DFN/6x5
M25P32-VMW6xG	MT25QL128ABA1ESE-0SIT	32Mb	SO8W
M25P32-VMP6xG	MT25QL128ABA1EW7-0SIT	32Mb	DFN/6x5
M25P32-VMF6xP	MT25QL128ABA8ESF-0SIT	32Mb	SO16W
M25P32-VME6xG	MT25QL128ABA1EW9-0SIT	32Mb	DFN/8x6
M25P64-VMF6xP	MT25QL128ABA8ESF-0SIT	64Mb	SO16W
M25P64-VME6xG	MT25QL128ABA1EW9-0SIT	64Mb	DFN/8x6
M25P128-VMF6xGB	MT25QL128ABA8ESF-0SIT	128Mb	SO16W
M25P128-VME6xGB	MT25QL128ABA1EW9-0SIT	128Mb	DFN/8x6

Note: 1. Refer to the packaging information for "x" in the part number of M25P (T = Tape and reel, Blank = Tube).





## **Revision History**

### **Rev. A – 04/17**

- Initial release

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