



# Conversion Guide

## Micron EOL M45PE Products

# Micron M45PE to Adesto AT45DB Conversion Guide

Designers, component engineers and sourcing teams are moving quickly to qualify alternatives that can support their long term demand and stabilize pricing due to the Micron EOL of all low density memory solutions, and specifically the byte alterable Micron M45PE series.

Adesto is the leader in byte alterable serial Flash solutions with >10 year product life and an added Adesto Longevity Program to provide long term support to the market. The Adesto AT45DB DATAFLASH family is a highly compatible replacement for all of the Micron M45PE products.

The Adesto AT45DB is pin and DC performance drop-in compatible to the Micron products, although consideration is needed with respect your application firmware and the command sets and Op Codes. Based on customer FAQs, the following guide will help with the conversion to the Adesto replacement and provides a quick comparison of the performance, architecture, function and even the software command sets and dimensional differences.

Contact [miconconvert@adestotech.com](mailto:miconconvert@adestotech.com) for technical assistance to replace the Micron M45PE with the AT45DB, receive samples or learn more about the Adesto Longevity Program.

## Contents:

Exact Part Number Cross Reference

Device Architecture Comparison

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Micron Device	Adesto Device	
M45PE20 or M45PE20_S*	AT45DB021E	
M45PE40 or M45PE40_S*	AT45DB041E	
M45PE80 or M45PE80_S	AT45DB081E	
M45PE16 or M45PE16_S*	AT45DB161E	
unavailable from Micron	AT45DB321E	upgrade path
unavailable from Micron	AT45DB641E	upgrade path

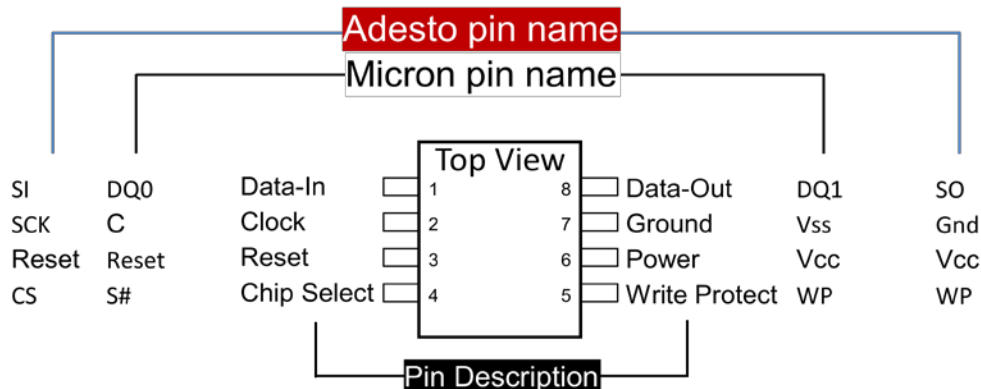
\*The 'S' suffix in the Micron Device Number represents factory programming. Adesto provides factory programming on all AT45 products. Contact info@adestotech.com for details.

Exact Part Number Cross-Reference			
Micron Part Number	Adesto Part Number	Micron Part Number	Adesto Part Number
M45PE20-VMN6G	AT45DB021E-SSHN2B-B	M45PE80-VMN6P	AT45DB081E-SSHN2B-B
M45PE20-VMN6TP	AT45DB021E-SSHN2B-T	M45PE80-VMN6G	AT45DB081E-SSHN2B-B
M45PE20-VMN6TG	AT45DB021E-SSHN2B-T	M45PE80-VMN6TP	AT45DB081E-SSHN2B-T
M45PE20-VMP6G	AT45DB021E-MHN2B-Y	M45PE80-VMN6TG	AT45DB081E-SSHN2B-T
M45PE20-VMP6TG	AT45DB021E-MHN2B-T	M45PE80-VMW6G	AT45DB081E-SHN2B-B
M45PE20-VMP6P	AT45DB021E-MHN2B-Y	M45PE80-VMW6TG	AT45DB081E-SHN2B-T
M45PE20-VMP6TP	AT45DB021E-MHN2B-T	M45PE80-VMW6P	AT45DB081E-SHN2B-B
M45PE20S-VMN6P	AT45DB021E-SSHN2B-T	M45PE80-VMW6TP	AT45DB081E-SHN2B-T
M45PE20S-VMN6G	AT45DB021E-SSHN2B-T	M45PE80-VMP6G	AT45DB081E-MHN2B-Y
M45PE20S-VMN6TP	AT45DB021E-SSHN2B-T	M45PE80-VMP6TG	AT45DB081E-MHN2B-T
M45PE20S-VMN6TG	AT45DB021E-SSHN2B-T	M45PE80-VMP6P	AT45DB081E-MHN2B-Y
M45PE20S-VMP6G	AT45DB021E-MHN2B-T	M45PE80-VMP6TP	AT45DB081E-MHN2B-T
M45PE20S-VMP6TG	AT45DB021E-MHN2B-T	M45PE16-VMW6G	AT45DB161E-SHF2B-B
M45PE20S-VMP6P	AT45DB021E-MHN2B-T	M45PE16-VMW6TG	AT45DB161E-SHF2B-T
M45PE20S-VMP6TP	AT45DB021E-MHN2B-T	M45PE16-VMW6P	AT45DB161E-SHF2B-B
M45PE40-VMN6G	AT45DB041E-SSHN2B-B	M45PE16-VMW6TP	AT45DB161E-SHF2B-T
M45PE40-VMN6P	AT45DB041E-SSHN2B-B	M45PE16-VMP6G	AT45DB161E-MHF2B-Y
M45PE40-VMN6TG	AT45DB041E-SSHN2B-T	M45PE16-VMP6TG	AT45DB161E-MHF2B-T
M45PE40-VMN6TP	AT45DB041E-SSHN2B-T	M45PE16-VMP6P	AT45DB161E-MHF2B-Y
M45PE40-VMP6G	AT45DB041E-MHN2B-Y	M45PE16-VMP6TP	AT45DB161E-MHF2B-T
M45PE40-VMP6P	AT45DB041E-MHN2B-Y	unavailable from Micron	AT45DB321E-MHF
M45PE40-VMP6TG	AT45DB041E-MHN2B-T	unavailable from Micron	AT45DB321E-SHF
M45PE40-VMP6TP	AT45DB041E-MHN2B-T	unavailable from Micron	AT45DB641E-MHN
M45PE40-VMW6G	AT45DB041E-SHN2B-B	unavailable from Micron	AT45DB641E-SHN
M45PE40-VMW6P	AT45DB041E-SHN2B-B		
M45PE40-VMW6TG	AT45DB041E-SHN2B-T		
M45PE40-VMW6TP	AT45DB041E-SHN2B-T		

<b>Architecture</b>			
	<b>Micron</b>	<b>Adesto</b>	<b>Optional page size available from Adesto</b>
<b>Product Name</b>	<b>M45PE20</b>	<b>AT45DB021E</b>	
Main Memory Size bytes	262,144	262,144	
Page Size	256 bytes	256 bytes	
# of Pages	1024	1024	
Sector Size	64KB	32KB	
# of Sectors	4	8	
Memory Buffer Size	256 byte	256 byte	<b>264 byte</b>
# of Data buffers	1	2	
<b>Product Name</b>	<b>M45PE40</b>	<b>AT45DB041E</b>	
Main Memory Size bytes	524,288	524,288	
Page Size	256 bytes	256 bytes	
# of Pages	2048	2048	
Sector Size	64KB	64KB	
# of Sectors	8	8	
Memory Buffer Size	256 byte	256 byte	<b>264 byte</b>
# of Data buffers	1	2	
<b>Product Name</b>	<b>M45PE80</b>	<b>AT45DB081E</b>	
Main Memory Size bytes	1,081,344	1,081,344	
Page Size	256 bytes	256 bytes	
# of Pages	2048	2048	
Sector Size	64KB	64KB	
# of Sectors	16	16	
Memory Buffer Size	256 byte	256 byte	<b>264 byte</b>
# of Data buffers	1	2	
<b>Product Name</b>	<b>M45PE16</b>	<b>AT45DB161E</b>	
Main Memory Size bytes	2,097,152	2,097,152	
Page Size	256 bytes	512 bytes	
# of Pages	2048	2048	
Sector Size	64KB	64KB	
# of Sectors	16	16	
Memory Buffer Size	256 byte	512 byte	<b>528 byte</b>
# of Data buffers	1	2	

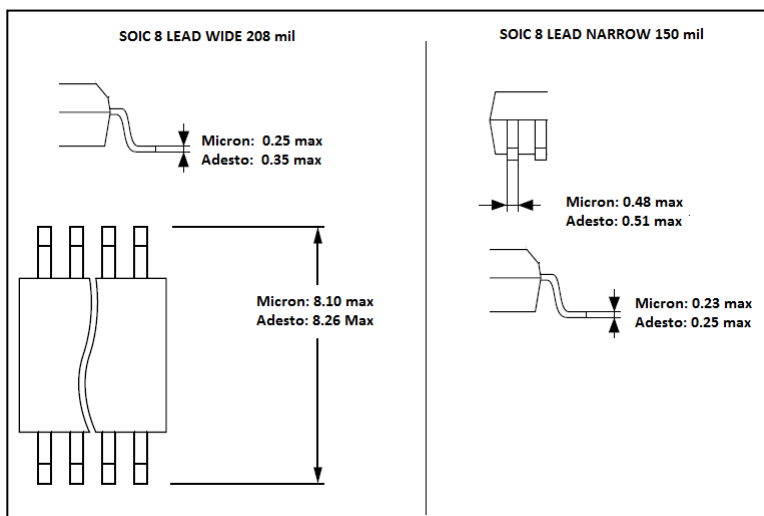
\*Take advantage of 2 Data Buffers, Flexible page architecture 256 or 264 byte and the Ultra Deep Power Down of Adesto over Micron on new designs

Pin Assignment- Adesto pinout is an exact match



Device Package			
Package Type	Micron Nomenclature	Adesto Nomenclature	Dimensional Comparison
Dual Flat No Lead MLP 8 TERMINAL	VQFPN	<b>8MA1</b>	Fully Compatible Replacement
SOIC 8 LEAD NARROW 150 mil	SO8N	<b>8S1</b>	Fully Compatible Replacement*
SOIC 8 LEAD WIDE 208 mil	SO8W	<b>8S2</b>	Fully Compatible Replacement*

\* Reference below figures for dimensional comparison



**Micron vs Adesto Op Code Comparison for the Application's Firmware  
(example given: 2 Mbit M45PE20 vs Adesto AT45DB021E)**

Function	Micron Op Code	Adesto Op Code	Notes	Adesto Data Sheet Section
Write Enable	06h	02h or 83h	Adesto 02h command is for Main Memory BYTE Programming. The Adesto 82h command is for Main Memory PAGE Programming	6.4 / 6.5
Write Disable	04h	3Dh + 2Ah + 7Fh + A9h	Enable Sector Protection Command	7.1.1
Read ID	9Fh	9Fh	Exact same functionality	12
Read Status Register	05h	D7h	Exact same functionality	9-1
Read Data Bytes	03h	01h	Adesto Continuous Array Read low power mode- 0 dummy byte compatible with Micron	5.3
Read Data Bytes-Higher Speed	0Bh	0Bh	Adesto Continuous Array Read- high frequency 1 dummy byte compatible with Micron	5.2
Page Write	0Ah	82h	Exact same functionality	6.4
Page Program	02h	88h	Exact same functionality	6.3
Page Erase	DBh	81h	Exact same functionality	6.6
Sector Erase	D8h	7Ch	Exact same functionality	6.8
Deep Power Down	B9h	B9h	Exact same functionality	10
Exit Deep Power Down	Abh	Abh	Exact same functionality	10.1
Ultra Deep Power Down	not available	79h	Exact same functionality	10.2

*Take advantage of over 30 additional Adesto commands on future designs, including protection and security, ultra deep power down, resume and user-configurable page*

<b>Function &amp; Performance</b>		
<b>Function</b>	<b>Micron</b>	<b>Adesto</b>
<b>Operating Voltage</b>	2.7 to 3.6 V	1.65 to 3.6 V
<b>Max Clock Freq</b>	75 MHz	85 MHz
<b>Read Status Register</b>	Assert S#, load Op Code De-assert S# = standby mode	Assert CS/, load Op Cmd, Data Out, De-assert CS/ = standby mode
<b>Polling</b>	Assert S#, load Op code; status change from 1 to 0 indicates completion, de-assert S# = Standby mode	Assert CS/, load Op code; status change from 0 to 1 indicates completion, de-assert CS/ = Standby mode
<b>Reset- hardware</b>	RESET low	RESET low
<b>Enter Deep Power Down Mode</b>	Assert S#, load Op Code De-assert S#	Assert CS/, load Op Code De-assert CS/
<b>Exit Deep Power Down Mode</b>	Assert S#, load Op Code De-assert S#, Delay = tRDP	Assert CS/, load Op Code De-assert CS/, Delay = $t_{edpd}$
<b>Protection Mode-Hardware</b>	POR Power On Reset	POR Power On Reset
<b>Protection Mode-Hardware</b>	RESET low	RESET low
<b>Protection Mode-Software</b>	Deep Power Down Command, Write Disable Command with W# asserted (hardware)	True Command driven Write, Erase and Programming protection with dedicated Sector Protection Command, including Sector Erase Protection Command
<b>Read Data</b>	Assert S#, load Op Code, load address. Continuous output. S# high = termination	Assert CS/ load Op Code 03h or 01h, load address, no dummy bits required. Continuous output. CS/ high = termination
<b>Page Write</b>	WE command, S# low, Page Write Command, 3 address bytes, data bytes, S# high. Page Write Cycle typical 11 ms	Assert CS/, Page Write Op Code, 3 address bytes, data bytes, CS/ high. Page Write typical 10 ms

## Function & Performance (cont'd)

Function	Micron	Adesto
Power Up Timing and Voltage	not specified	POR Power On 1.45 V minimum, 70 $\mu$ s delay for read, 3 ms maximum for Program or Erase Operation
Power Up Min Threshold ( $V_{WI}$ or $V_{POR}$ )	1.5 V min / 2.5V max (spec $V_{WI}$ )	1.45 V min / 1.6 V max (spec $V_{POR}$ )
Minimum Delay Vcc minimum to Read Operation ( $t_{VCSL}$ )	30 $\mu$ s	70 $\mu$ s
Minimum Delay Vcc minimum to Write, Program, Erase Operation ( $t_{PUW}$ )	3 ms	10 ms
RESET - software	n/a	CS/ low, Op Code, de-assert CS/, Execution within $t_{SWRST}$
Write-in-Progress or Rdy/Bsy	WIP bit in status register; logic state '0' indicates completion	Rdy/Bsy bit in status register; logic state '1' indicates completion
Protection Mode-Hardware Write Protect Sector Protection	Assert W# , Sector Protection Register	Assert WP/ , Sector Protection Register
Read Mfgr ID	Assert S#, load Op Code De-assert S# = standby mode	Assert CS/, load Op Code De-assert CS/ = standby mode
Mfg ID 3 byte Code: 2 Mb Device	20h 40h 12h	1Fh 23h 00h
Mfg ID 3 byte Code: 4 Mb Device	20h 40h 13h	1Fh 24h 00h
Mfg ID 3 byte Code: 8 Mb Device	20h 40h 14h	1Fh 25h 00h
Mfg ID 3 byte Code: 16 Mb Device	20h 40h 15h	1Fh 26h 00h



Contact [miconvert@adestotech.com](mailto:miconvert@adestotech.com) for technical assistance as well as learning more about the Adesto Longevity Program.

Request a free Adesto AT45DB Memory Sample Set at <http://www.adestotech.com/contact-support/sample-request/>

## Download Datasheets

Adesto Brand	Density	Product#	Webiste Link
DATAFLASH	2 Mb	AT45DB021E	<a href="http://www.adestotech.com/wp-content/uploads/doc8789.pdf">http://www.adestotech.com/wp-content/uploads/doc8789.pdf</a>
DATAFLASH	4 Mb	AT45DB041E	<a href="http://www.adestotech.com/wp-content/uploads/doc8783.pdf">http://www.adestotech.com/wp-content/uploads/doc8783.pdf</a>
DATAFLASH	8 Mb	AT45DB081E	<a href="http://www.adestotech.com/wp-content/uploads/DS-45DB081E_028.pdf">http://www.adestotech.com/wp-content/uploads/DS-45DB081E_028.pdf</a>
DATAFLASH	16 Mb	AT45DB161E	<a href="http://www.adestotech.com/wp-content/uploads/doc8782.pdf">http://www.adestotech.com/wp-content/uploads/doc8782.pdf</a>