

Flash Product Roadmap

Q2, 2023



Flash Process Technology

NOR

130nm

110nm

75nm

68nm

55nm

45nm

3D

- 2024

NAND

75nm

SLC

36nm

SLC

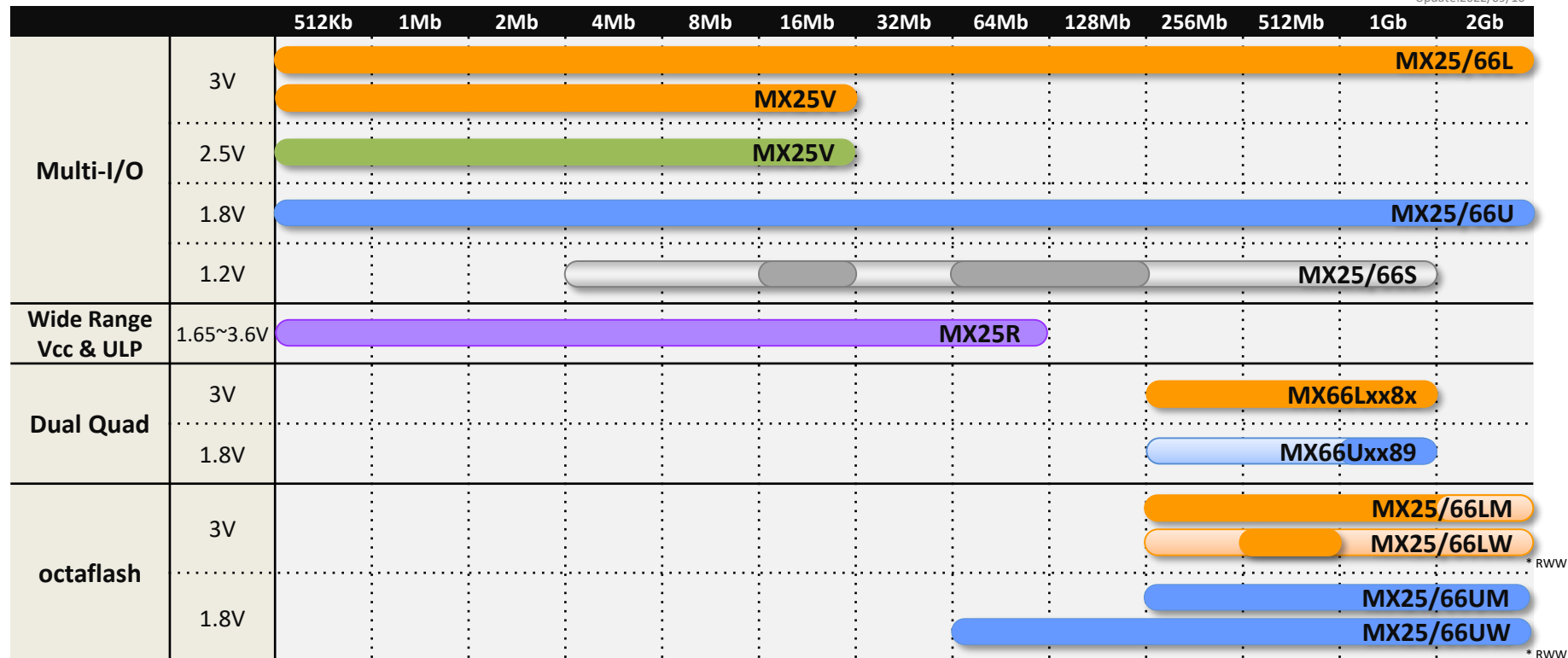
19nm

MLC

SLC

Serial NOR Flash Memory Portfolio

Update:2022/09/16



* RWW

* RWW

Note: (1) Roadmap information is subject to change without notice. (2) Light shaded means new products in development

Update:2022/12/19

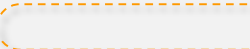
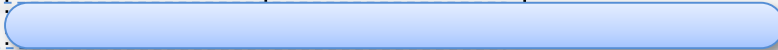
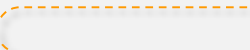
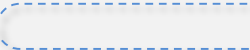
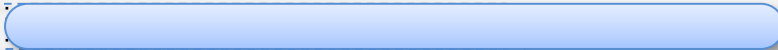
- * Octal I/O

- * Octal I/O

MACRONIX
www.macronix.com

3D NOR Flash Memory Portfolio

Update:2022/12/07

		1Gb	2Gb	4Gb	8Gb
Multi-I/O QSPI	3V				
	1.8V				
Octaflash	3V				
	1.8V				

Note: (1) Roadmap information is subject to change without notice. (2) Light shaded means new products in development

Parallel NOR Flash Memory Portfolio

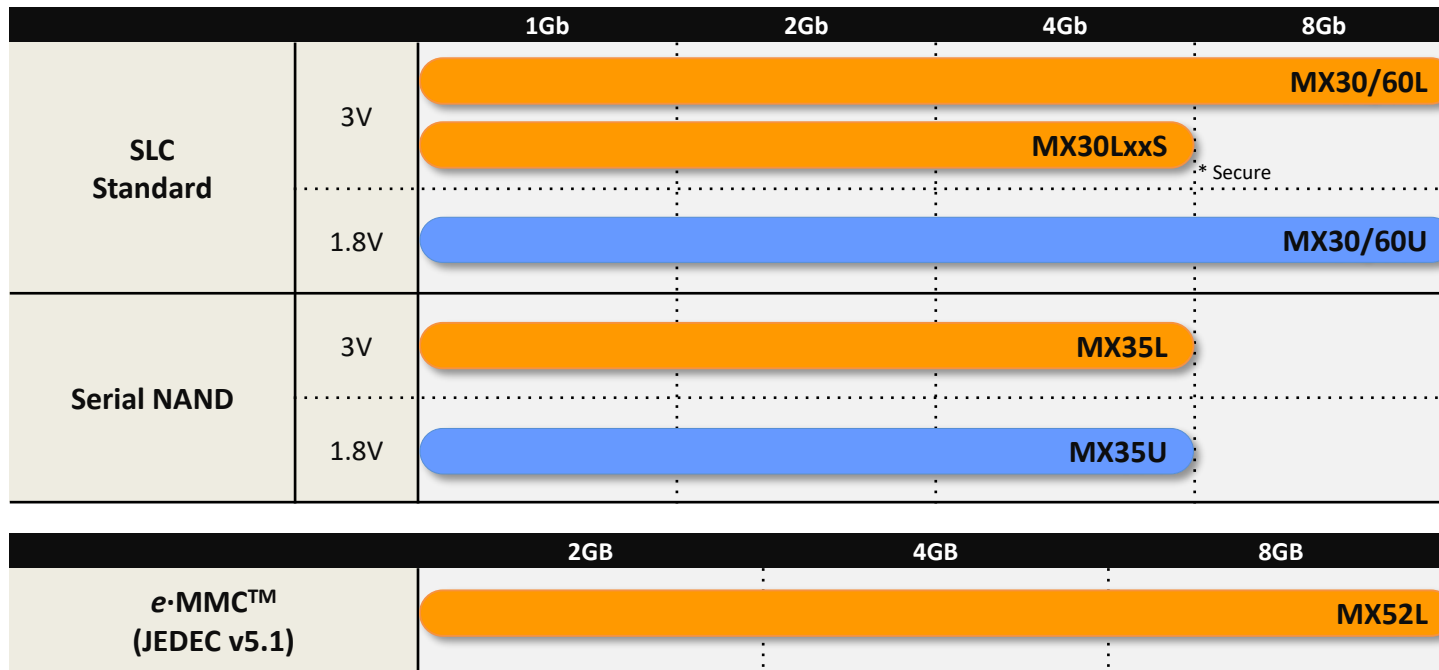
Update:2022/09/15

		2Mb	4Mb	8Mb	16Mb	32Mb	64Mb	128Mb	256Mb	512Mb	1Gb
Page Read	3V					MX29/68GL					
Standard Read	3V		MX29LV								
	5V	MX29F									

Note: (1) Roadmap information is subject to change without notice. (2) Light shaded means new products in development

NAND Flash Memory Portfolio

Update:2022/06/16



Note: (1) Roadmap information is subject to change without notice. (2) Light shaded means new products in development

Comprehensive Product Solutions

By Market Sectors

Comprehensive Portfolio for Code+Data Storage (NOR, SLC/SPI NAND & eMMC)

RMA Performance Measured in Part Per Billion (PPB)

In-House Wafer Fabs to Ensure Quality & Longevity

Global Network of Sales & Engineering Support

	Communications/ Computing/Consumer	Medical	Automotive	Industrial
Feature	• Wide Range of Form Factor Options • RPMC (for computing)	• Small Form Factor • Low Voltage • Security • Low EMI* • Longevity Support	• AEC-Q100 Qualified (Temp. Grade 1-3) • ISO 26262/IATF 16949/ISO 21434 • Functional Safety (FuSa) and Security • Longevity Support	• Extended Temp. Coverage (-55°C to +125°C) • Longevity Support
Value-added Product	• Ultra Low Power Consumption • 1.2V Vcc • Wide Range Vcc (1.65V - 3.6V) • SLC/SPI NAND & eMMC	• Ultra Low Power Consumption • 1.2V Vcc • Wide Range Vcc (1.65V - 3.6V) • SLC/SPI NAND & eMMC	• ArmorFlash (Safety & Security) • octaflash (High Speed) • SLC/SPI NAND	• ArmorFlash (Safety & Security) • octaflash (High Speed) • SLC/SPI NAND & eMMC

Note: EMI: Electromagnetic Interference, tested for Carnation Ambulatory Monitor

MACRONIX



Serial NOR Flash

3V Serial NOR Flash (Mid/High Density)

Update:2023/03/16

MX25/66L Series

Key Features

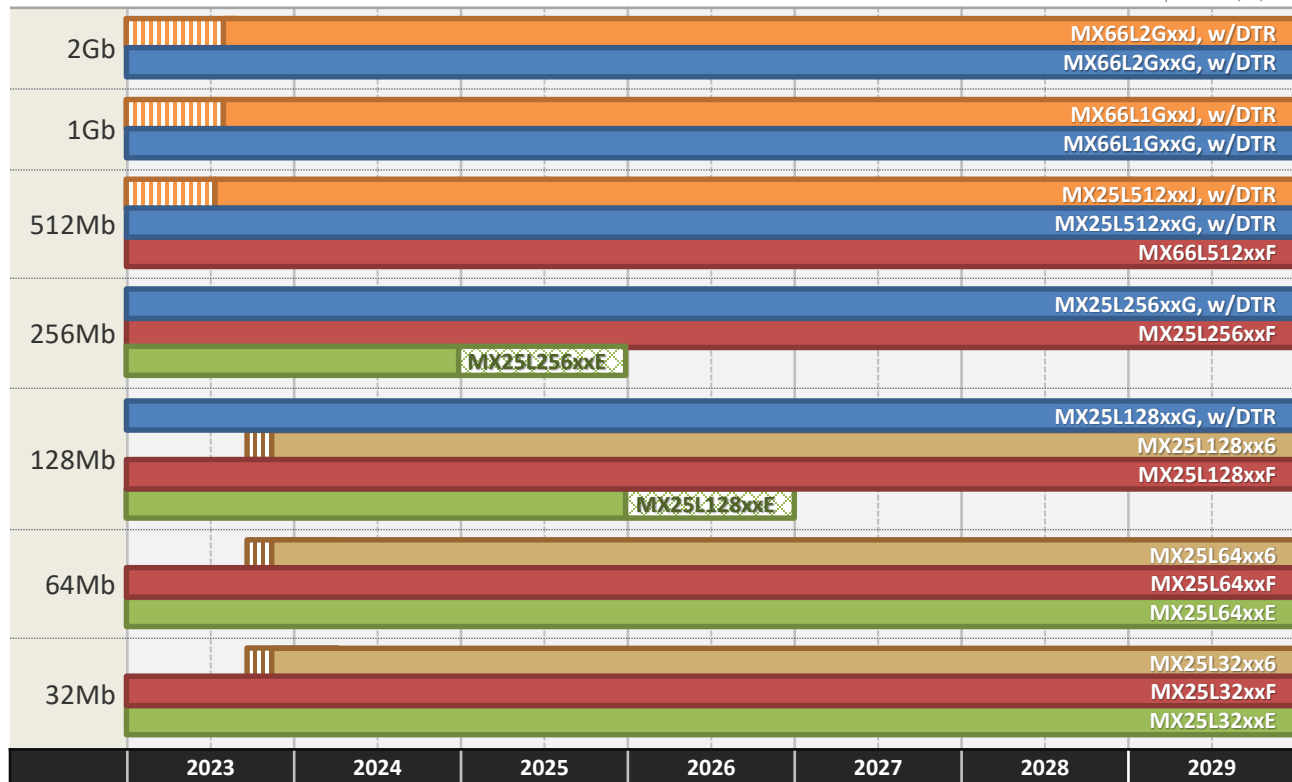
- 4KB uniform sectors
- Single, dual or quad I/O option
- Single-in or multi-in addressing
- Industrial temperature range

Process Node

45nm 55nm 68nm 75nm
110nm

Legend:

||||| = Sample phase
■ = Production phase
◇◇◇◇ = EOL phase



Note: (1) Roadmap information is subject to change without notice. (2) DTR = Double Transfer Rate (3) Automotive grade products available; please contact your local sales for further details.

3V / 2.5V Serial NOR Flash (Low Density)

Update:2021/09/30

MX25L Series MX25V Series

Key Features

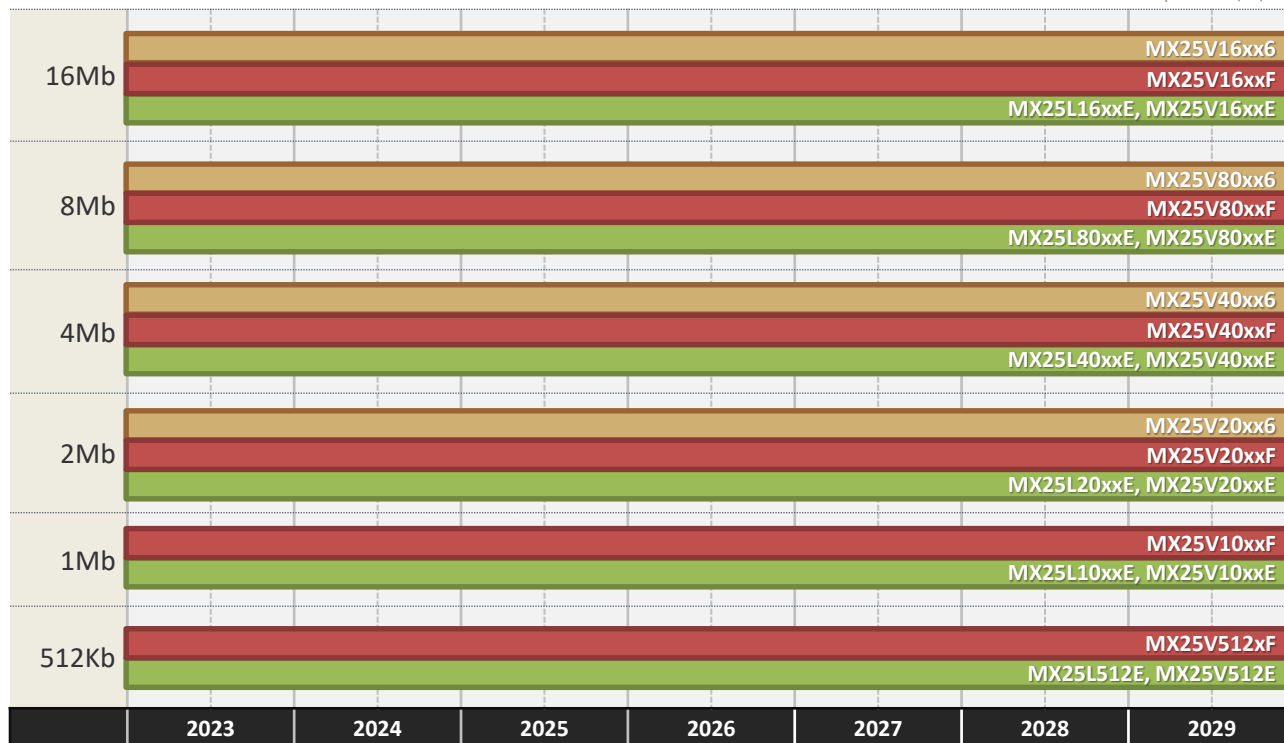
- Vcc Range:
MX25L-E: 2.7 – 3.6V
MX25V-F: 2.3 – 3.6V
MX25V-E: 2.35 – 3.6V
- Single, dual, or quad I/O options
- Industrial temperature range

Process Node

68nm 75nm 110nm

Legend:

■ = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) DTR = Double Transfer Rate (3) Automotive grade products available; please contact your local sales for further details.

1.8V Serial NOR Flash (Mid/High Density)

Update:2023/03/07

MX25/66U Series

Key Features

- Single, dual, or quad I/O option
- Fast read for SPI & QPI mode
- Suspend & Resume
- Industrial temperature range

Process Node

45nm

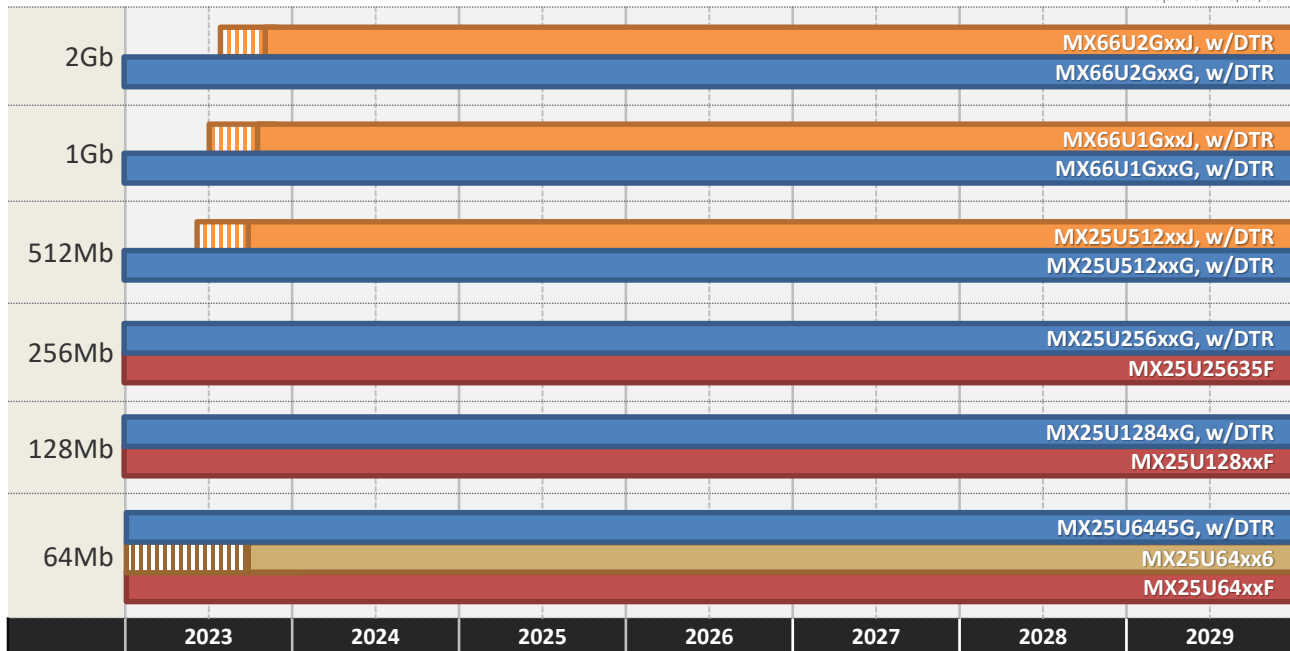
55nm

68nm

75nm

Legend:

- ||||||| = Sample phase
- = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) DTR = Double Transfer Rate (3) Automotive grade products available; please contact your local sales for further details.

1.8V Serial NOR Flash (Low Density)

MX25U Series

Key Features

- Single, dual, or quad I/O option
- Fast read for SPI & QPI mode
- Suspend & Resume
- Industrial temperature range

Process Node

68nm

75nm

110nm

Legend:

- ||||| = Sample phase
- = Production phase
- ◇◇◇◇ = EOL phase

Update:2023/03/07



Note: (1) Roadmap information is subject to change without notice. (2) Automotive grade products available: please contact your local sales for further details.

1.2V Serial NOR Flash

Update:2023/03/14

MX25/66S Series

Key Features

- Vcc Range: 1.14V – 1.6V
- 4KB uniform sectors
- Single, dual, or quad I/O option
- 120MHz
- Suspend & Resume
- Unique ID & Secured OTP
- Industrial temperature range

Process Node

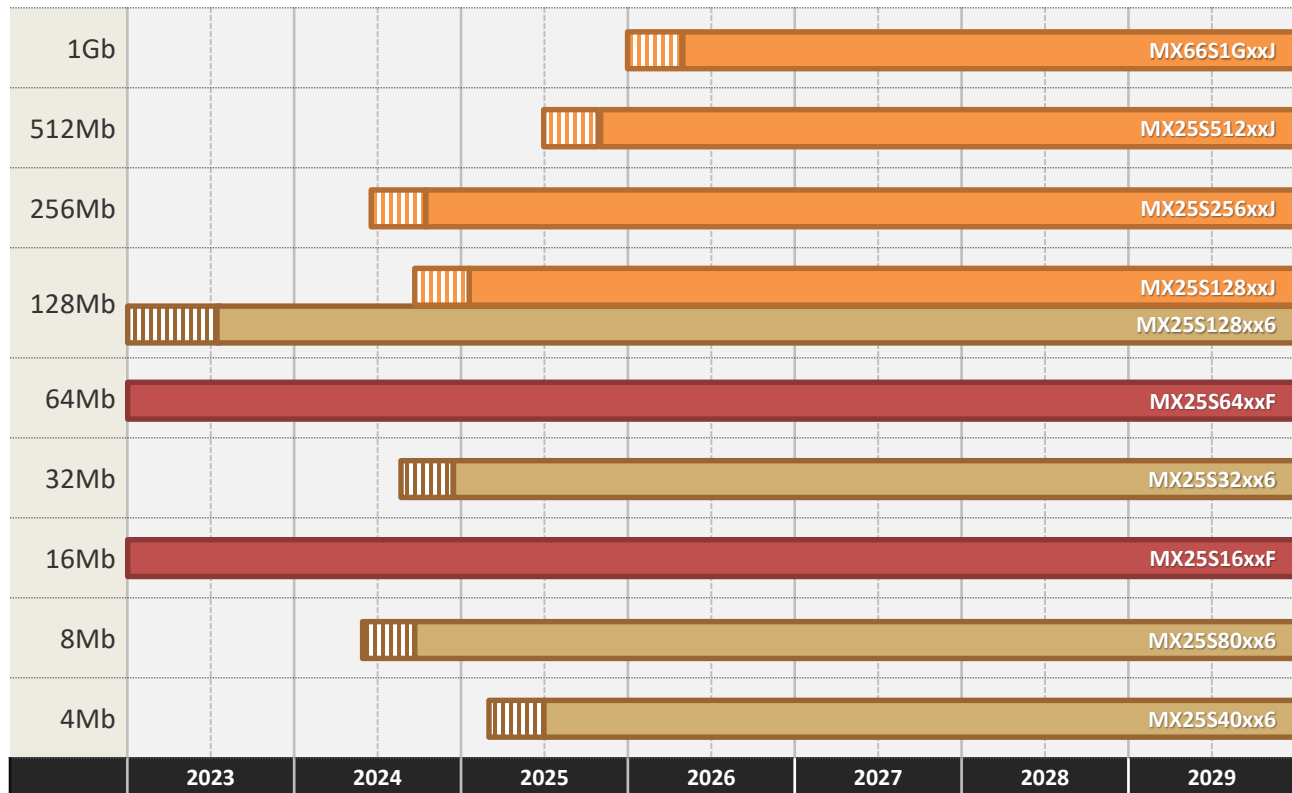
45nm

68nm

75nm

Legend:

- ||||||| = Sample phase
- = Production phase



Note: Roadmap information is subject to change without notice.

Wide Range Vcc & Ultra Low Power Serial Flash

Update:2019/03/15

MX25R Series

Key Features

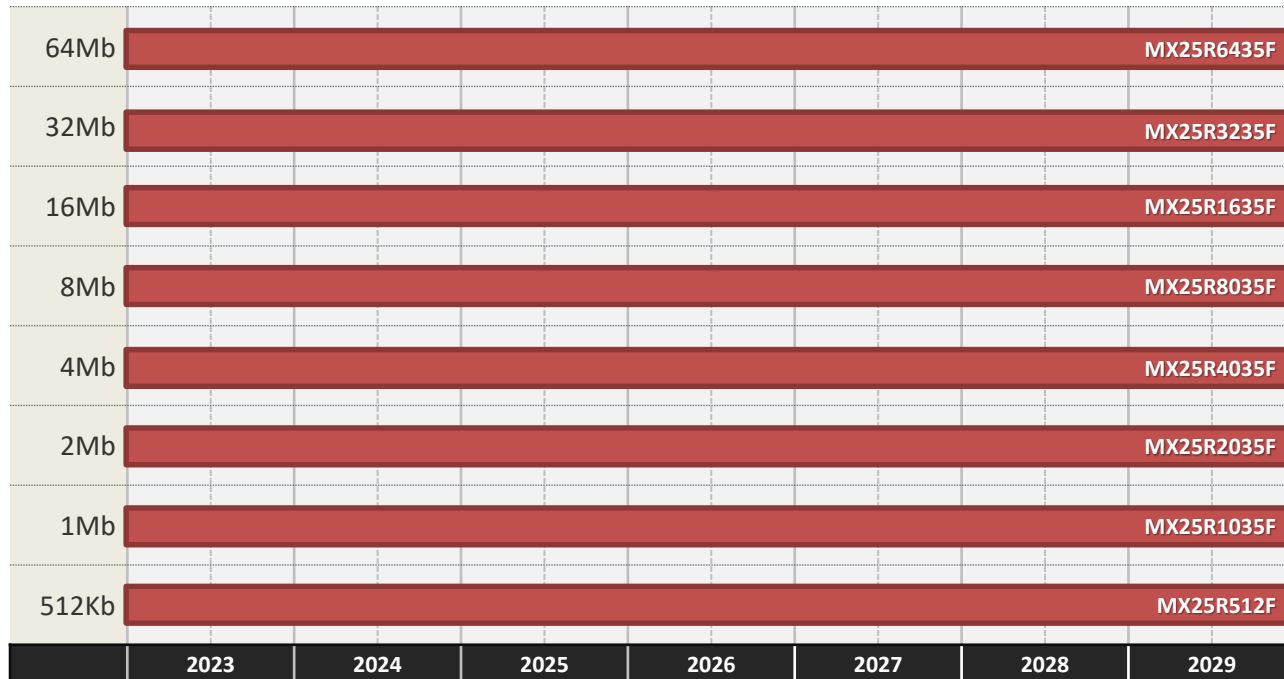
- Ultra low power consumption
- Vcc Range: 1.65 – 3.6V
- 4KB uniform sectors
- Single, dual, or quad I/O option
- Suspend & Resume
- Unique ID & Secured OTP
- Industrial temperature range

Process Node

75nm

Legend:

 = Production phase



Note: Roadmap information is subject to change without notice.

Dual Quad Serial Flash

Update:2022/12/12

MX66Uxx89 Series

Key Features

- 1.8V Dual Quad, x8 I/O option
- 2 CS#, 2 SCLK
- 4KB uniform sectors
- 100MHz with DTR

MX66Lxx8x Series

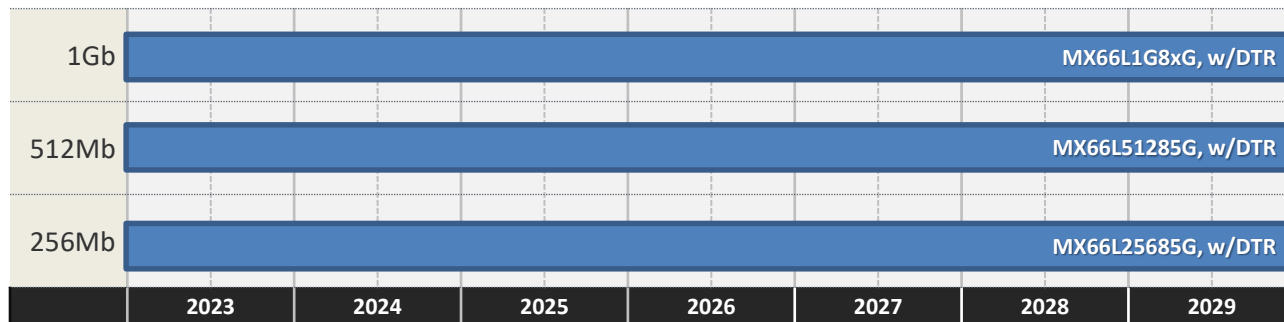
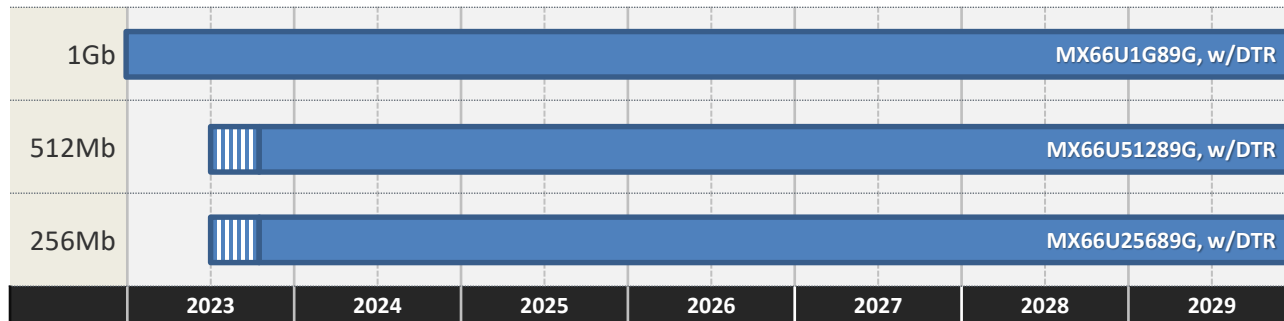
Key Features

- 3V Dual Quad, x8 I/O option
- 1 CS#, 1 SCLK & 2 CS#, 2 SCLK options⁴
- 4KB uniform sectors
- 100MHz with DTR

Process Node

55nm

Legend: ||||| = Sample phase
■ = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) DTR = Double Transfer Rate. (3) Automotive grade products available: please contact your local sales for further details.
(4) 3V, 1Gb has 1 CS#, 1 SCLK & 2 CS#, 2 SCLK options; 3V, 512Mb & 256Mb have 1 CS#, 1 SCLK option now, 2 CS#, 2 SCLK are under evaluation.

1.8V octaflash Memory

Update:2021/09/13

MX25/66UM Series MX25/66UW Series

Key Features

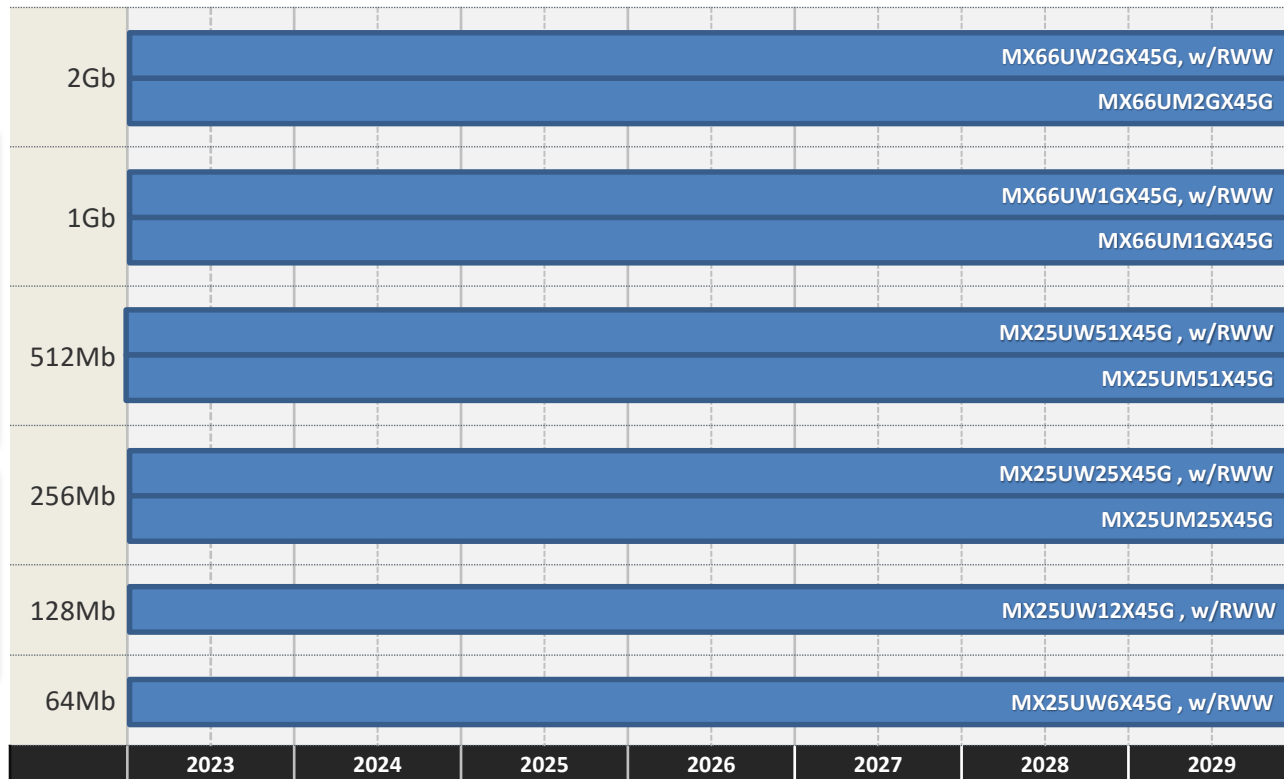
- Octal or Single I/O option
- MX25/66UM: Standard octaflash
MX25/66UW: octaflash w/RWW, Read-While-Write Feature
- 4KB uniform sectors
- 200MHz with DTR
- Industrial temperature range

Process Node

55nm

Legend:

 = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) DTR = Double Transfer Rate (3) Automotive grade products available; please contact your local sales for further details.

3V octaflash Memory

Update:2023/03/02

MX25/66LM Series MX25/66LW Series

Key Features

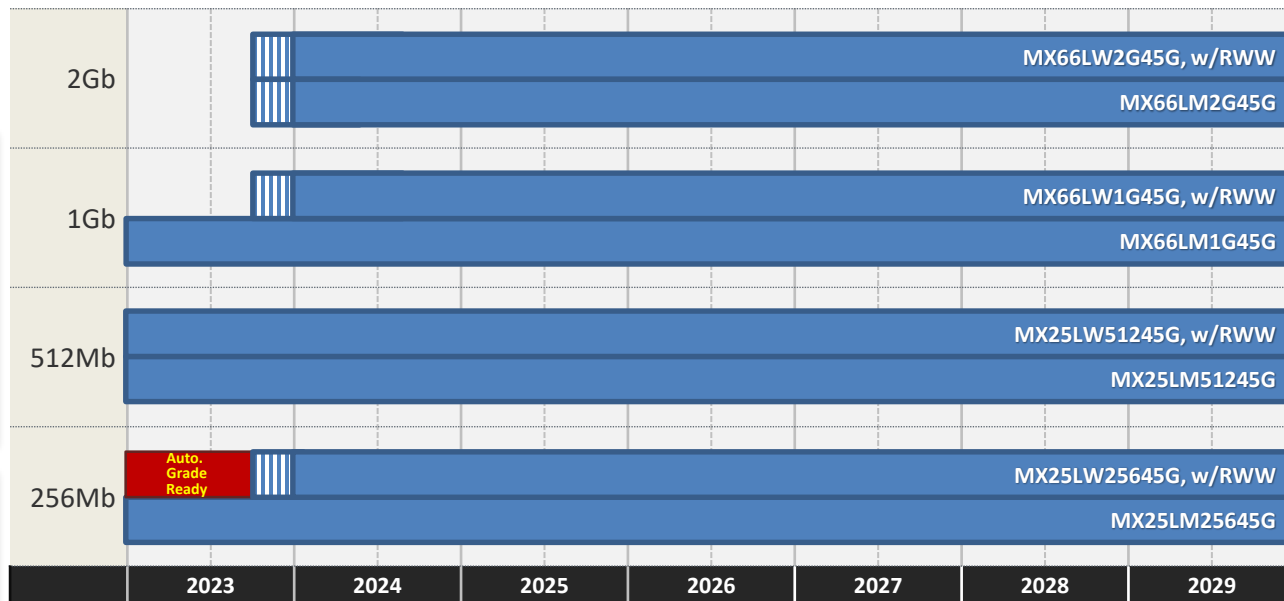
- Octal or Single I/O option
- MX25/66LM: Standard octaflash
MX25/66LW: octaflash w/RWW,
Read-While-Write Feature
- 4KB uniform sectors
- 133MHz with DTR
- Industrial temperature range

Process Node

55nm

Legend:

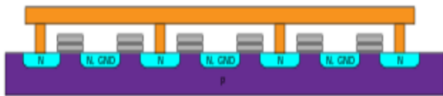
- ||||||| = Sample phase
- = Production phase



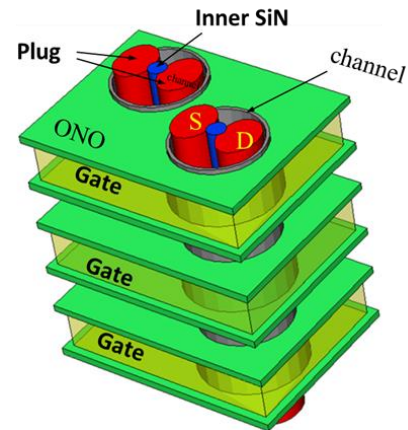
Note: (1) Roadmap information is subject to change without notice. (2) DTR = Double Transfer Rate (3) Automotive grade products available; please contact your local sales for further details.

Advantage of 3D Technology

2D NOR FG Flash



3D NOR Flash



- ❑ Existing NOR technology limited scalability at 4xnm node
- ❑ 32-layer, 3D Stackable provides high-density at smaller form factor
- ❑ Keep moderate large device size to maintain large memory window and excellent reliability

3D NOR Flash Memory

Update:2022/12/07

3D NOR Series

Key Features

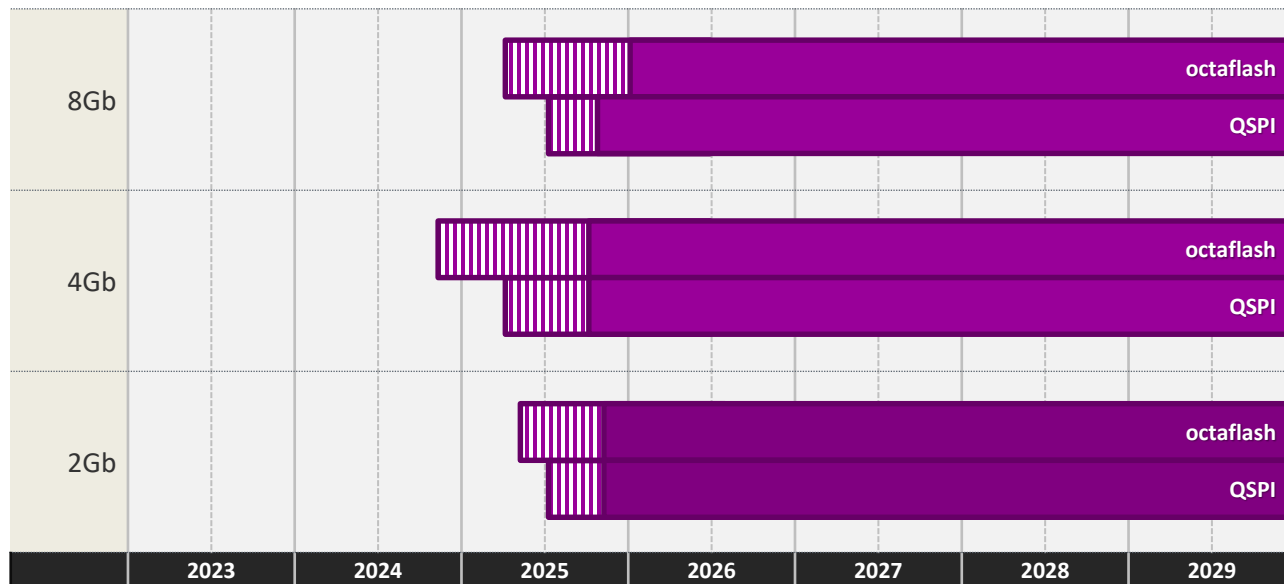
- 3V/1.8V QSPI/octetflash Interface
 - QSPI: x1/x2/x4 I/O
 - octaflash : x1/x8 I/O
- High Speed:
 - QSPI: 133MHz DTR
 - octaflash: 200MHz DTR
- Industrial temperature range

Process Node

3D NOR

Legend:

- ||||||| = Sample phase
- = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) 19nm, 4Gb Page/block size = 4KB/256KB. (3) 36nm ECC required: 1Gb B-die ECC free, C-die 4-bit ECC is required. (4) 19nm ECC required: 8-bit or ECC-free.

RPMC Serial Flash

Update:2021/09/13

MX77Uxx50 Series

Key Features

- 1.8V, Default 4 I/O enable
- Meets Intel's RPMC Specification
- 4KB uniform sectors
- Industrial temperature range

MX25/77Lxx50 Series

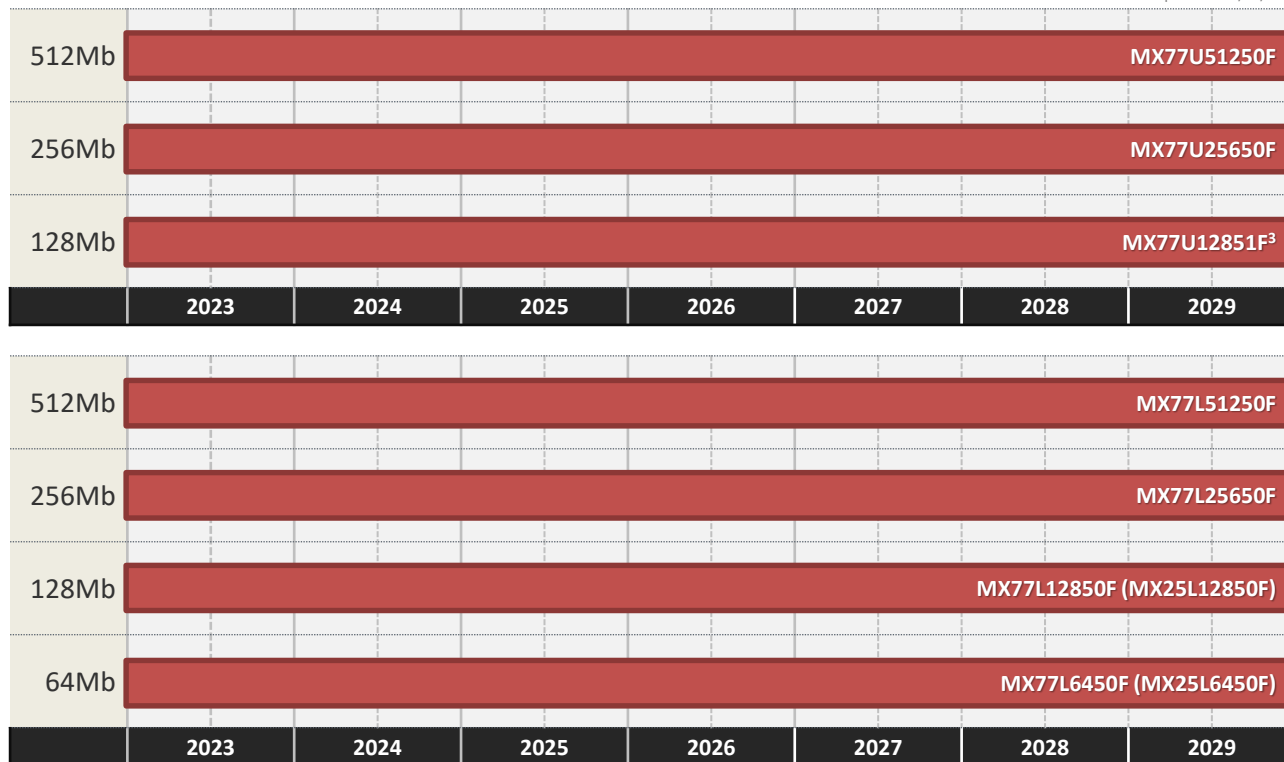
Key Features

- 3V, Default 4 I/O enable
- Meets Intel's RPMC Specification
- 4KB uniform sectors
- Industrial temperature range

Process Node

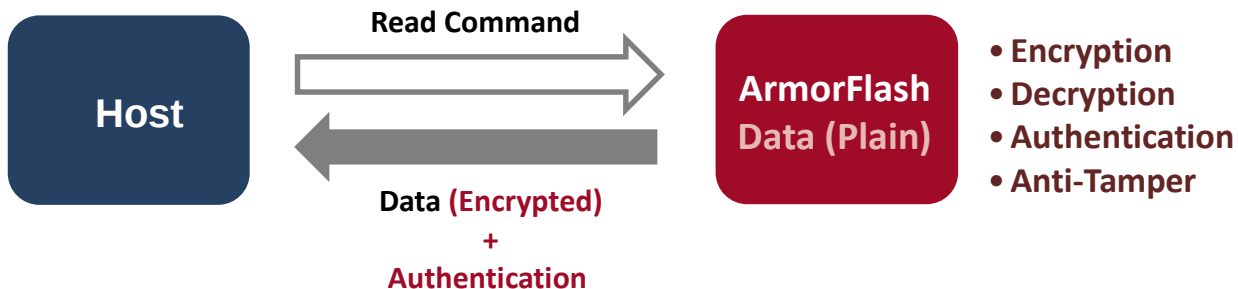
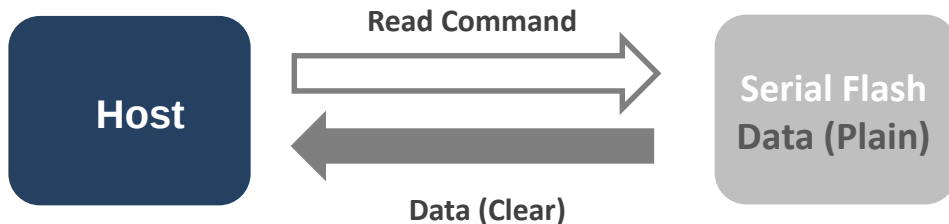
75nm

Legend:  = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) RPMC= Replay-Protected Monotonic Counter. (3) MX77UF12851F equipped with 8 counters while others are 4 counters.

Serial Flash vs. ArmorFlash™ Data Flow



1.8V ArmorFlash™ Secure NOR Flash

MX75/78U(M) Series

Key Features

- 1.8V, Single, Dual, Quad or Octal I/O
- AES256 Hardware Engine
- Authentication/Encryption/Decryption
- Monotonic Counter, PUF
- MX75: Symmetric key provision
MX78: Asymmetric key provision

Process Node

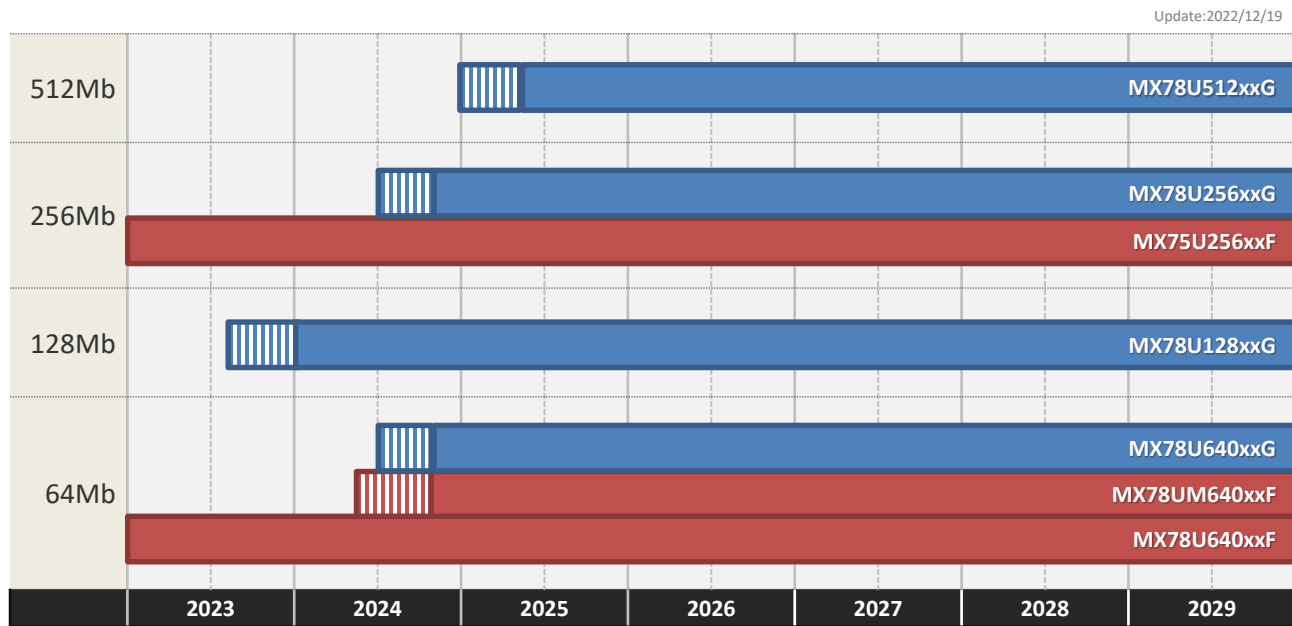
55nm

75nm

Legend:

||||||| = Sample phase

■ = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) Please contact your local sales for detail security features. (3) Product feature & design are different among the generations.

3V ArmorFlash™ Secure NOR Flash

MX75/78L(M) Series

Key Features

- 3V, Single, Dual, Quad or Octal I/O
- AES256 Hardware Engine
- Authentication/Encryption/Decryption
- Monotonic Counter, PUF
- MX75: Symmetric key provision
MX78: Asymmetric key provision

Process Node

55nm

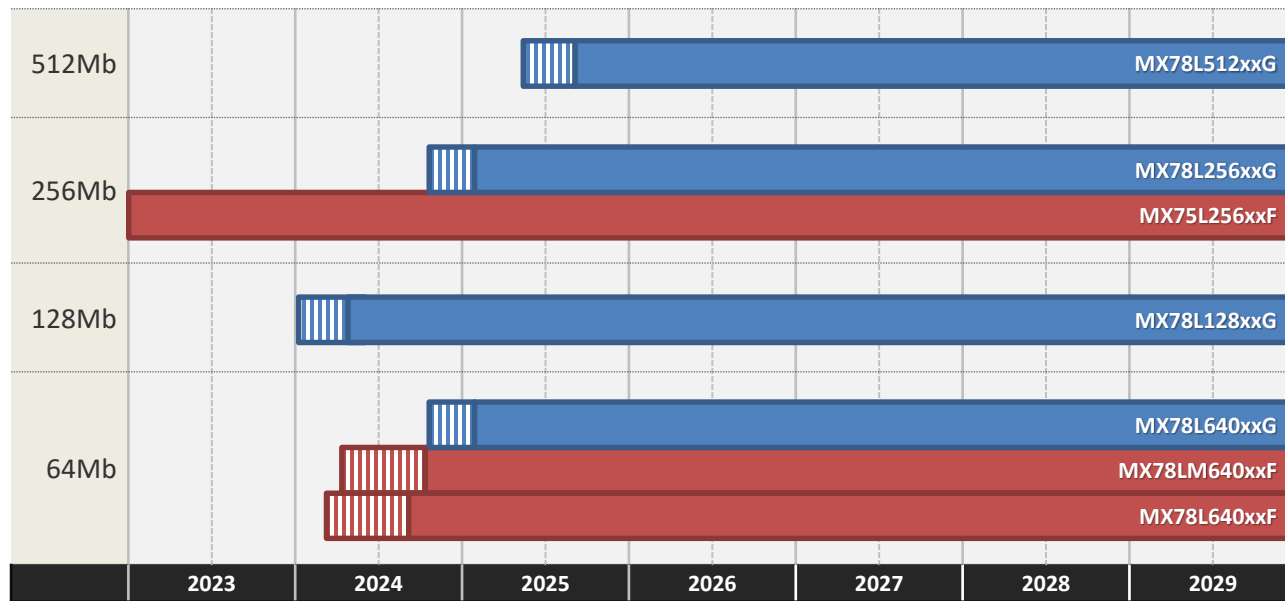
75nm

Legend:

||||||| = Sample phase

■ = Production phase

Update:2022/12/19



Note: (1) Roadmap information is subject to change without notice. (2) Please contact your local sales for detail security features. (3) Product feature & design are different among the generations.

3V Serial NOR Flash Packages

Update:2022/12/08

Available Developing	512Kb	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb	128Mb	256Mb	512Mb	1Gb	2Gb
8-SOP (150mil)	●	●	●	●	●	●	●	●					
8-SOP (200mil)				●	●	●	●	●	●	●			
8-VSOP (200mil)							●	●					
16-SOP (300mil)						●	●	●	●	●	●	●	
8-PDIP (300mil)				●	●	●	●	●	●				
8-TSSOP (173mil)	●	●											
8-WSON (6x5)			●	●	●	●	●	●	●	●			
8-WSON (8x6)							●	●	●	●	●	●	
8-USON (2x3)	●	●	●	●									
8-USON (4x3)							●	●					
8-USON (4x4)					●	●	●	●					
24-TFBGA (8x6, 4x6 balls)							●	●	●				
24-TFBGA (8x6, 5x5 balls)						●	●		●	●	●	●	●
WLCSP	⦿	●	⦿	⦿	⦿	⦿		●					

Note: Roadmap information is subject to change without notice.

1.8V Serial NOR Flash Packages

Update:2022/12/07

Available Developing	512Kb	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb	128Mb	256Mb	512Mb	1Gb	2Gb
8-SOP (150mil)	●	●	●	●	●	●	●	●					
8-SOP (200mil)					●	●	●	●	●	●			
8-VVSOP (150mil)			●	●	●	●							
8-VSOP (200mil)								●					
16-SOP (300mil)									●	●	●	●	●
8-TSSOP (173mil)	●												
8-WSON (6x5)			●	●	●	●	●	●	●	●			
8-WSON (8x6)									●	●	●	●	
8-WLGA (6x5)										●			
8-USON (2x3)	●	●	●	●	●	●							
8-USON (4x3)			●	●		●	●	●					
8-USON (4x4)			●	●	●	●	●						
8-XSON (4x4)			●	●	●	●	●	●	●				
24-TFBGA (8x6, 5x5 balls)									●	●	●	●	●
WLCSOP			●	●	●	●	●	●	●	●	●		

Note: Roadmap information is subject to change without notice.

2.5V Serial NOR Flash Packages

Update:2016/06/15

Available	512Kb	1Mb	2Mb	4Mb	8Mb	16Mb
8-SOP (150mil)						
8-SOP (200mil)						
8-TSSOP (173mil)						
8-WSON (6x5)						
8-USON (2x3)						
8-USON (4x3)						
8-VVSOP (150mil)						
24-TFBGA (8x6, 4x6 balls)						

Note: Roadmap information is subject to change without notice.

1.2V Serial NOR Flash Packages

Update:2022/09/16

 Available  Developing	4Mb	8Mb	16Mb	32Mb	64Mb	128Mb	256Mb	512Mb	1Gb
8-SOP (150 mil)									
8-SOP (200 mil)									
16-SOP (300 mil)									
8-WSON (8x6)									
8-WSON (6x5)									
8-USON (2x3)									
8-USON (4x3)									
8-XSON (4x4)									
24-TFBGA (8x6, 5x5 balls)									
WLCSP									
KGD									

Note: Roadmap information is subject to change without notice.

Wide Range Vcc & Ultra Low Power Serial Flash Packages

Update:2022/09/15

Available	512Kb	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb
8-SOP (150 mil)	●	●	●	●	●	●	●	●
8-SOP (200 mil)					●	●	●	●
8-TSSOP (173mil)	●	●	●					
8-WSON (6x5)				●	●	●	●	●
8-USON (2x3)	●	●	●	●	●	●		
8-USON (4x3)							●	●
8-USON (4x4)								●
WLCSP	●	●	●	●	●	●	●	●

Note: Roadmap information is subject to change without notice.

Dual Quad and octaflash Packages

Update:2019/12/11

 Available  Developing	64Mb	128Mb	256Mb	512Mb	1Gb	2Gb
3V Dual Quad Serial						
24-TFBGA (8x6, 5x5 balls)						
16-SOP (300mil)*						
1.8V Dual Quad Serial						
24-TFBGA (8x6, 5x5 balls)						
3V octaflash						
24-TFBGA (8x6, 5x5 balls)						
16-SOP (300mil)						
1.8V octaflash						
24-TFBGA (8x6, 5x5 balls)						
16-SOP (300mil)						
WLCSP						

Note: (1) Roadmap information is subject to change without notice. (2) * only available for MX66Lxx85.

3D NOR Flash Memory Packages

Update:2022/12/07

 Available Developing	2Gb	4Gb	8Gb
3V / 1.8V octaflash			
24-TFBGA (8x6, 5x5 balls)			
24-TFBGA (8x9, 5x5 balls)			
16-SOP (300mil)*			
3V/1.8V QSPI			
24-TFBGA (8x6, 5x5 balls)			
24-TFBGA (8x9, 5x5 balls)			
16-SOP (300mil)			
8 WSON (6x8mm ²)			

Note: Roadmap information is subject to change without notice.

RPMC Serial Flash Packages

Update:2021/09/13

Available Developing	64Mb	128Mb	256Mb	512Mb
3V RPMC Serial Flash				
8-SOP (200mil)	●	●		
16-SOP (300mil)			●	●
8-WSON (6x5)	●	●		
8-WSON (8x6)		●	●	●
8-PDIP (300mil)	●	●		
1.8V RPMC Serial Flash				
8-SOP (200mil)		●		
16-SOP (300mil)			●	●
8-WSON (6x5)		●		
8-WSON (8x6)			●	●

Note: Roadmap information is subject to change without notice.

ArmorFlash™ Secure NOR Flash Packages

Update:2021/12/10

 	Available Developing	64Mb	128Mb	256Mb	512Mb
1.8V ArmorFlash™ Secure NOR					
24-TFBGA (8x6, 5x5 balls)					
16-SOP (300mil)					
KGD					
3V ArmorFlash™ Secure NOR					
24-TFBGA (8x6, 5x5 balls)					
16-SOP (300mil)					
KGD					

Note: Roadmap information is subject to change without notice.



Parallel NOR Flash

3V Page Mode Parallel NOR Flash

MX29/68GL Series

Key Features

- Page mode access
- Boot or uniform sectors
- x8 / x16 bus width
- Hardware & software protection
- 55nm GL series featuring speed enhancement with extended page/buffer size
- Industrial temperature range

Process Node

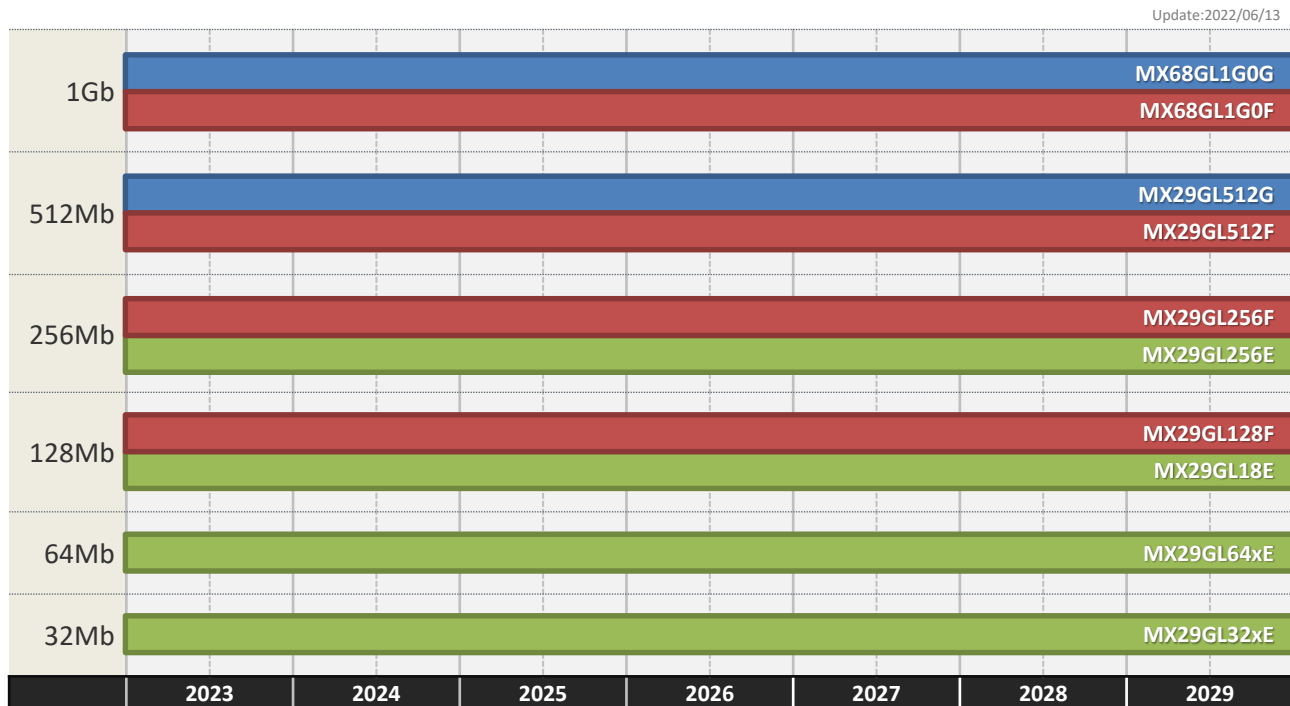
55nm

75nm

110nm

Legend:

 = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) 2Gb part currently offered in 70-SSOP Package. (3) Automotive grade products available: please contact your local sales for further details.

3V Standard Parallel NOR Flash

MX29LV Series

Key Features

- Boot sectors
- Industrial temperature range

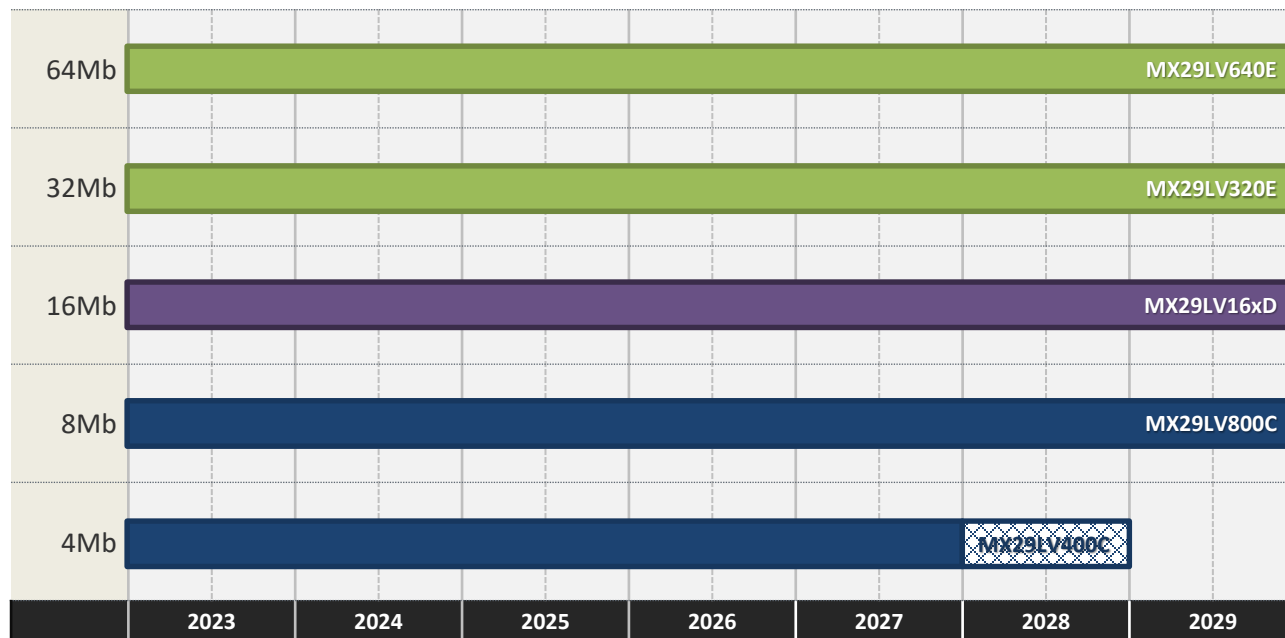
Process Node

110nm 130nm 150nm

Legend:

- = Production phase
- ▨ = EOL phase

Update:2022/12/12



Note: (1) Roadmap information is subject to change without notice. (2) Automotive grade products available: please contact your local sales for further details.

5V Standard Parallel NOR Flash

Update:2018/12/12

MX29F Series

Key Features

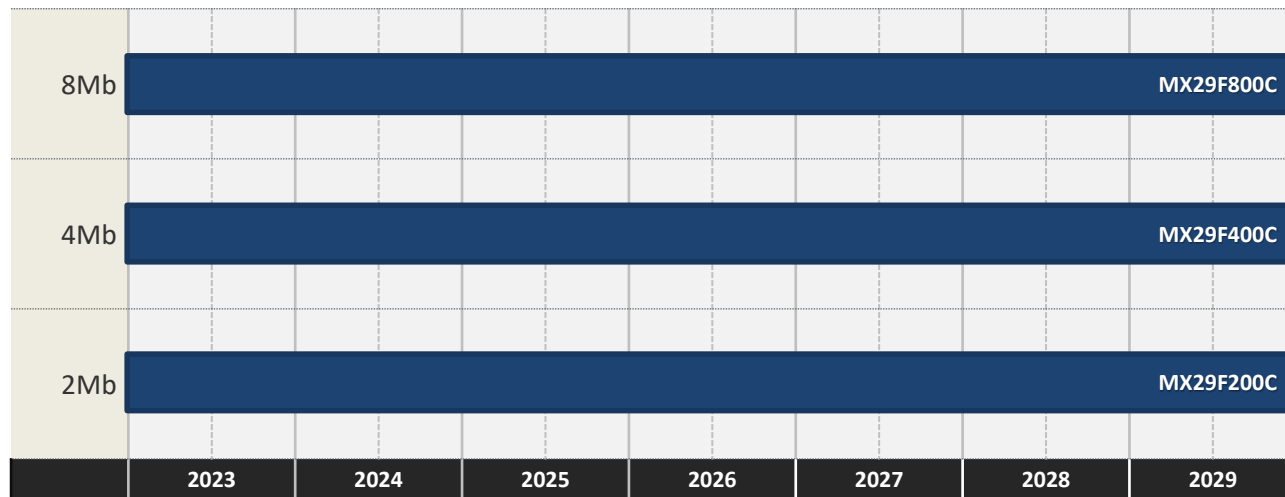
- Boot sectors
- Industrial temperature range

Process Node

150nm

Legend:

 = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) Automotive grade products available: please contact your local sales for further details.

3V Parallel Flash Packages

Update:2021/03/17

Available	4Mb	8Mb	16Mb	32Mb	64Mb	128Mb	256Mb	512Mb	1Gb
48-TSOP									
56-TSOP									
48-XFLGA (4x6)									
48-WFBGA (4x6)									
48-TFBGA (6x8)									
56-FBGA (7x9)									
64-LFBGA (11x13)									
70-SSOP									

Note: Roadmap information is subject to change without notice.

5V Parallel Flash Packages

Update:2019/06/28

 Available	2Mb	4Mb	8Mb
48-TSOP			
48-TFBGA (6x8)			

Note: Roadmap information is subject to change without notice.



SLC NAND Flash

3V SLC NAND Flash

Update:2021/12/01

MX30/60L Series

Key Features

- SLC x8 family
- Page/block size: 2KB/128KB²
- 1, 4 & 8-bit ECC options³
- Industrial temperature range

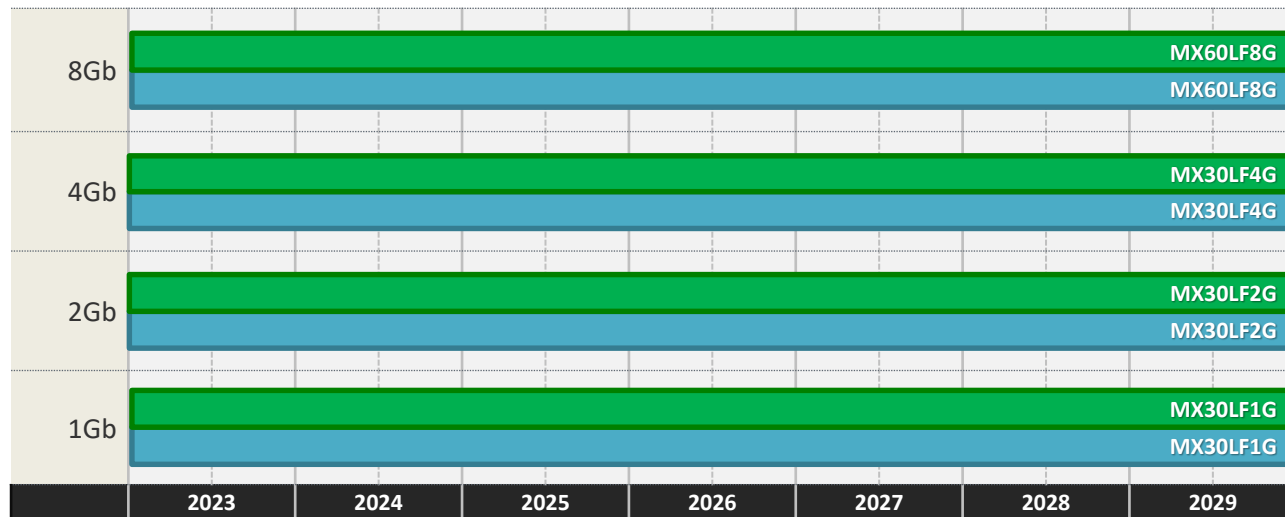
Process Node

19nm

36nm

Legend:

 = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) 19nm, 4Gb Page/block size = 4KB/256KB. (3) 19nm ECC required: 8-bit. (4) Automotive grade products available: please contact your local sales for further details.

3V Secure NAND Flash

Update:2022/09/05

MX30LxxS Series

Key Features

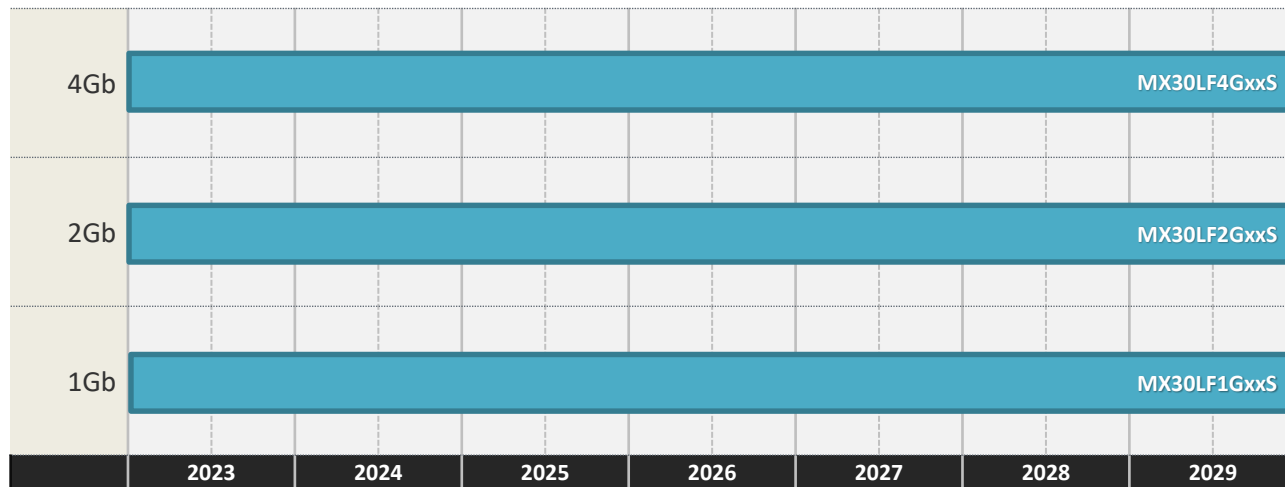
- SLC x8 family
- Page/block size: 2KB/128KB
- Permanently Block-Locked (PBL) feature
- 4-bit ECC options
- Industrial temperature range

Process Node

36nm

Legend:

 = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) the Secure NAND is not recommended for new designs.

1.8V SLC NAND Flash

Update:2021/06/15

MX30/60U Series

Key Features

- SLC x8 & x16 family
- Page/block size: 2KB/128KB²
- 4, 8-bit ECC options³
- Industrial temperature range

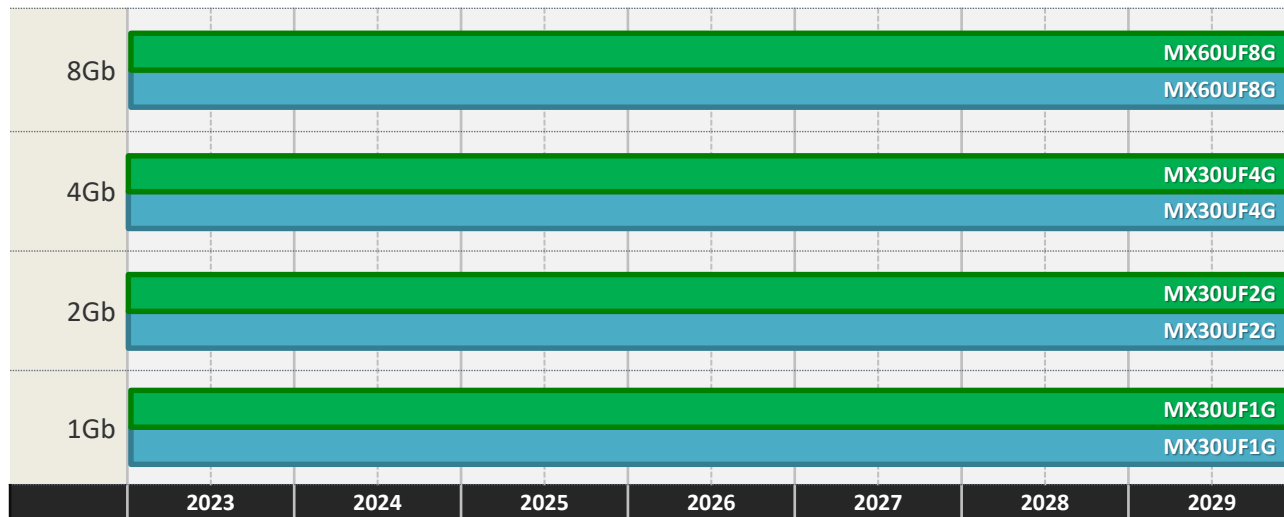
Process Node

19nm

36nm

Legend:

 = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) 19nm, 4Gb & 8Gb Page/block size = 4KB/256KB. (3) 19nm ECC required: 8-bit.

SLC NAND Flash Overview

Update:2022/12/07

Series		3V SLC		1.8V SLC	
		MX30L-B/C Family	MX30L-D Family	MX30U-B/C Family	MX30U-D Family
Process node		36nm	19nm	36nm	19nm
VCC Range		2.7-3.6V	2.7-3.6V	1.7-1.95V	1.7-1.95V
Feature	Organization	x8	x8	x8 and x16 options	x8
	ECC required	8-bit/ 4-bit	8-bit	8-bit/ 4-bit	8-bit
	Page size	2KB+112B/ 2KB+64B	1/2G: 2KB+128B 4G: 4KB+256B	2KB+112B ² / 2KB+64B	1/2G: 2KB+128B 4G: 4KB+256B
	Block size	128KB+7KB/ 128KB+4KB	1/2G: 128KB+8KB 4G:256KB+16KB	128KB+7KB/ 128KB+4KB	1/2G: 128KB+8KB 4G:256KB+16KB
	Cache program	2KB+112B/ 2KB+64B	1/2G: 2KB+128B 4G: 4KB+256B	2KB+112B/ 2KB+64B	1/2G: 2KB+128B 4G: 4KB+256B
	# of Planes	2: 2Gb/4Gb 1: 1Gb	2: 2Gb/4Gb 1:1GB	2: 2Gb/4Gb 1: 1Gb	2: 2Gb/4Gb 1:1GB
	ONFI 1.0 compliant	Yes	Yes	Yes	Yes
	Permanently Block-Locked	Yes	Yes	-	-
Performance	Random access (max)	25us	25us	25us	25us
	Sequential read (min)	20ns	20ns	25ns	25ns
	Page Program (typ)	300us	320us	320us	320us
	Block erase time (typ)	1ms	4ms	1ms	4ms
	ICC read/pgm/erase (max)	30mA	30mA	30mA	30mA
	Standby current (max)	50uA	50uA	50uA	50uA

Note: (1) Roadmap information is subject to change without notice. (2) 1.8V 4Gb, C-die page size: 2KB+128B

SLC NAND Flash Packages

Update:2022/12/12

 Available  Developing	1Gb	2Gb	4Gb	8Gb
3V SLC NAND Flash				
48-TSOP				
63-VFBGA (9x11)				
3V Secure NAND Flash				
63-VFBGA (9x11)				
1.8V SLC NAND Flash				
48-TSOP				
48-VFBGA (6x8)				
63-VFBGA (9x11)				

Note: (1) Roadmap information is subject to change without notice. (2) the Secure NAND & 48-VFBGA package (6x8) are not recommended for new designs.

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Serial NAND Flash

3V Serial NAND Flash

Update:2023/03/07

MX35L Series

Key Features

- SLC x4 family
- Page/block size: 2KB/128KB²
- 4 & 8-bit, & ECC Free options^{3&4}
- Continuous read⁵
- Industrial temperature range

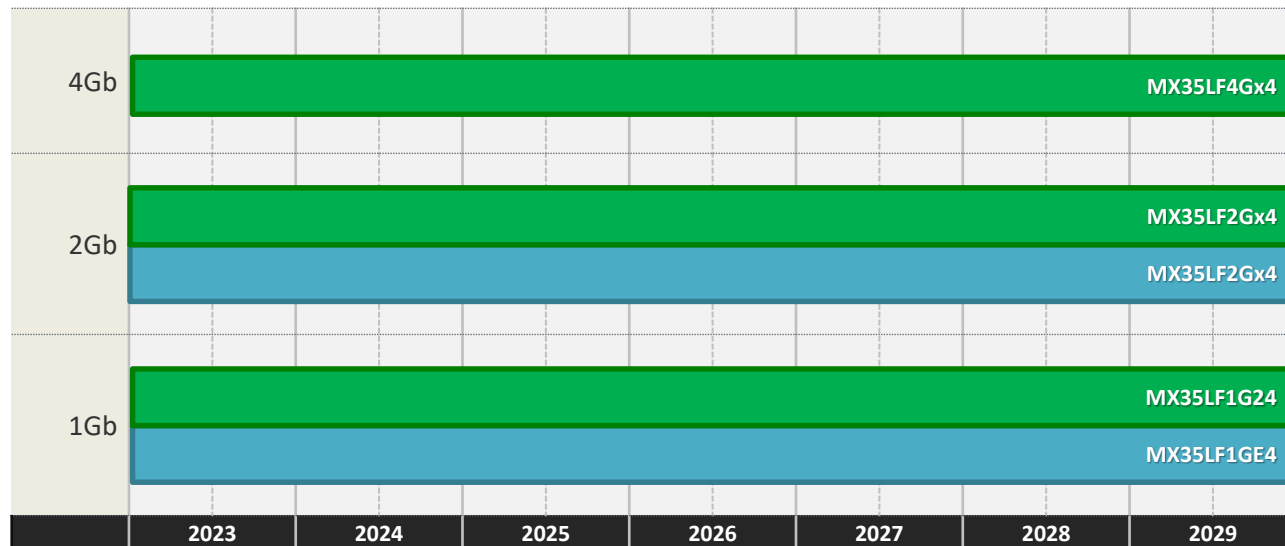
Process Node

19nm

36nm

Legend:

 = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) 19nm, 4Gb Page/block size = 4KB/256KB. (3) 36nm ECC required: 1Gb B-die ECC free, C-die 4-bit ECC is required. (4) 19nm ECC required: 8-bit or ECC-free. (5) Continuous read is supported on MX35xFxxE4AC(AD).

1.8V Serial NAND Flash

MX35U Series

Key Features

- SLC x4 family
- Page/block size: 2KB/128KB²
- 4 & 8-bit, & ECC Free options^{3&4}
- Continuous read⁵
- Industrial temperature range

Process Node

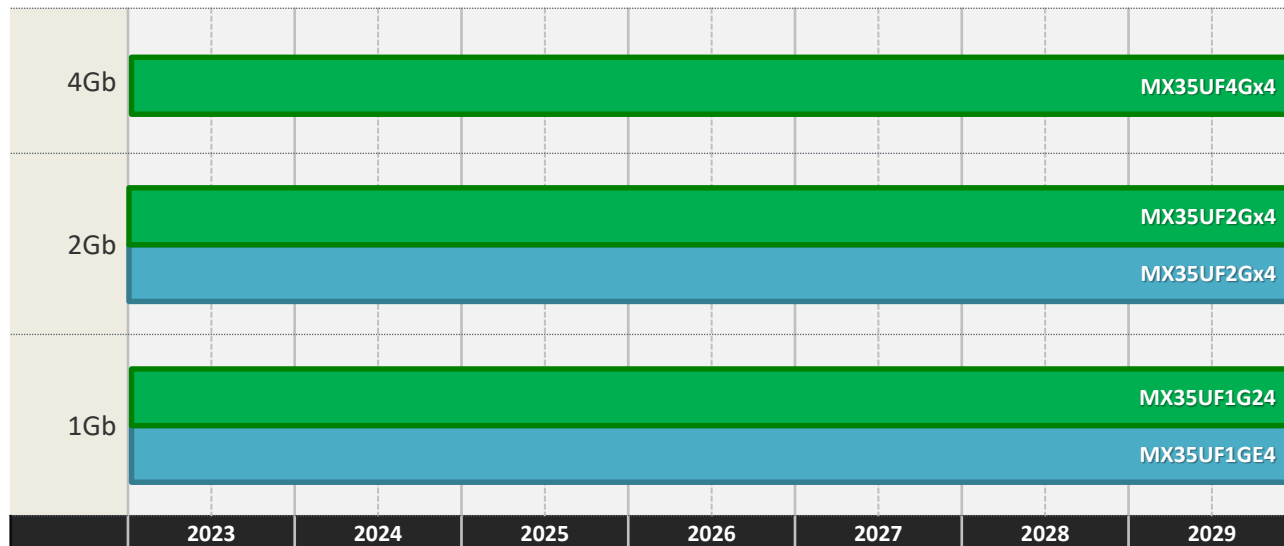
19nm

36nm

Legend:

 = Production phase

Update:2023/03/07



Note: (1) Roadmap information is subject to change without notice. (2) 19nm, 4Gb Page/block size = 4KB/256KB. (3) 2Gb: B-die ECC free, C-die 4-bit ECC is required. (4) 19nm ECC required: 8-bit, or ECC-free (ECC-free option is advanced information). (5) Continuous read is supported on MX35xFxxE4AC(AD).

3V Serial NAND Flash Overview

Update:2023/03/07

Series		MX35LxxE4 Family		MX35Lxx14 Family	MX35Lxx24 Family
Process node		36nm	19nm	36nm	19nm
VCC Range		2.7-3.6V	2.7-3.6V	2.7-3.6V	2.7-3.6V
Feature	Organization	x4	x4	x4	x4
	ECC required	Built-in ECC	Built-in ECC	4-bit	8-bit
	Page size	2KB+64B	2Gb:2KB+128B 4Gb:4KB+256B	2KB+64B	1/2Gb:2KB+128B 4Gb:4KB+256B
	Block size	128KB+4KB	2Gb:128KB+8KB 4Gb:256KB+16KB	128KB+4KB	1/2Gb:128KB+8KB 4Gb:256KB+16KB
	Page read mode ²	Single (1-1-1) Dual (1-1-2) Quad (1-1-4)	Single (1-1-1) Dual:(1-1-2),(1-2-2) Quad:(1-1-4),(1-4-4)	Single (1-1-1) Dual (1-1-2) Quad (1-1-4)	Single (1-1-1) Dual:(1-1-2),(1-2-2) Quad:(1-1-4),(1-4-4)
	Contiguous read	Supported in E4AC family	Supported	N/A	N/A
Performance	Random access (max)	70us	70us (2Gb) 110us (4Gb)	25us	25us
	Read Freq. (typ)	104MHz	104MHz	104MHz	120MHz
	Page Program (typ)	320us	360us (2Gb) 400us (4Gb)	300us	320us
	Block erase time (typ)	1ms	4ms	1ms	4ms

Note: (1) Roadmap information is subject to change without notice. (2) Read Speed per command, address & data.

1.8V Serial NAND Flash Overview

Update:2023/03/07

Series		MX35UxxE4 Family		MX35Uxx14 Family	MX35Uxx24 Family
Process node		36nm	19nm	36nm	19nm
VCC Range		1.7-1.95V	1.7-1.95V	1.7-1.95V	1.7-1.95V
Feature	Organization	x4	x4	x4	x4
	ECC required	Built-in ECC	Built-in ECC	4-bit	8-bit
	Page size	2KB+64B	1/2Gb:2KB+128B 4Gb: 4KB+256B	2KB+64B	1/2Gb:2KB+128B 4Gb:4KB+256B
	Block size	128KB+4KB	1/2Gb:128KB+8KB 4Gb:256KB+16KB	128KB+4KB	1/2Gb:128KB+8KB 4Gb:256KB+16KB
	Page read mode ²	Single (1-1-1) Dual (1-1-2) Quad (1-1-4)	Single (1-1-1) Dual:(1-1-2),(1-2-2) Quad:(1-1-4),(1-4-4)	Single (1-1-1) Dual (1-1-2) Quad (1-1-4)	Single (1-1-1) Dual:(1-1-2),(1-2-2) Quad:(1-1-4),(1-4-4)
	Contiguous read	Supported in E4AC family	Supported	N/A	N/A
Performance	Random access (max)	70us	80us(1/2Gb) 110us(4Gb)	25us	25us
	Read Freq. (typ)	104MHz	133MHz	104MHz	133MHz/166MHz
	Page Program (typ)	360us	360us (1/2Gb) 400us (4Gb)	320us	320us
	Block erase time (typ)	1ms	4ms	1ms	4ms

Note: (1) Roadmap information is subject to change without notice. (2) Read Speed per command, address & data.

Serial NAND Flash Packages

Update:2021/09/13

 Available  Developing	1Gb	2Gb	4Gb
3V Serial			
8-WSON (8x6)			
1.8V Serial			
8-WSON (8x6)			

Note: Roadmap information is subject to change without notice.

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MCP Solutions

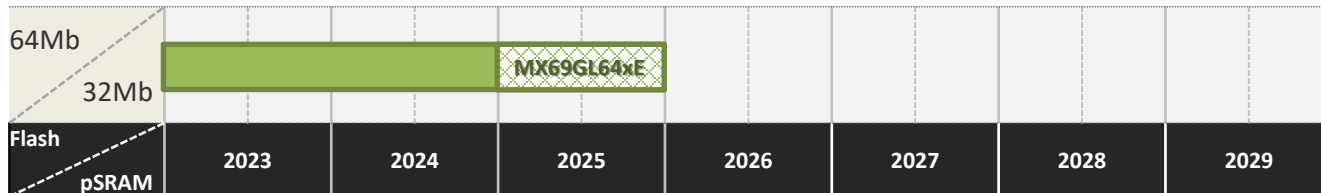
NOR Flash MCP

Update:2022/09/15

MX69GL Series

Key Features

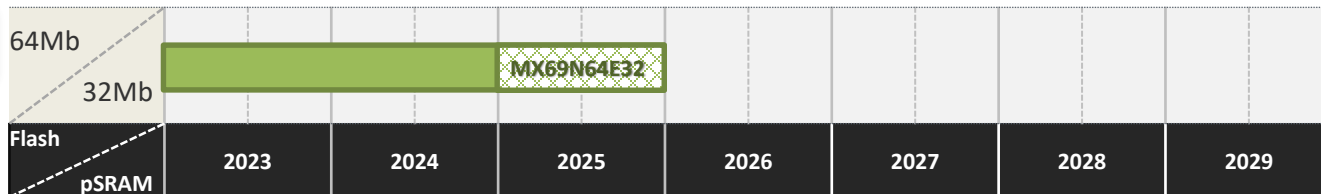
- 3V, x16 NOR, x16 pSRAM
- Page Mode, Parallel



MX69N Series

Key Features

- 1.8V, x16 NOR, x16 pSRAM
- AD-MUX, Burst Mode



Process Node

110nm

Legend:

- = Production phase
- ▨ = EOL phase

Note: Roadmap information is subject to change without notice.

1.8V SLC NAND Flash MCP

Update:2022/12/12

MX63U Series

Key Features

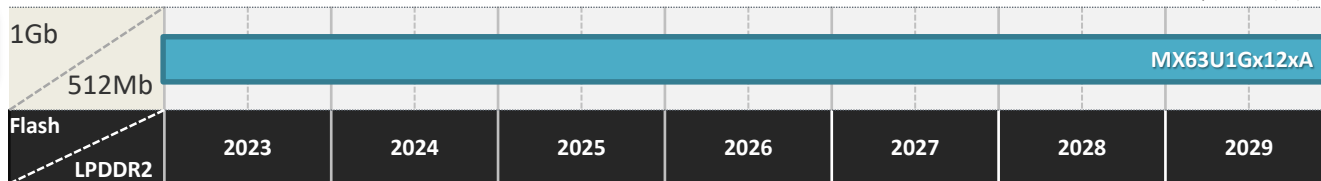
- SLC NAND
- LPDDR2

Process Node

36nm

Legend:

■ = Production phase



Note: Roadmap information is subject to change without notice.

NOR Flash MCP Packages

Update:2022/12/12

 Available	NOR	64Mb
	pSRAM	32Mb
1.8V NOR Flash MCP		
52-FBGA* (6x6)		
3V NOR Flash MCP		
56-FBGA (7x9)		

Note: (1) Roadmap information is subject to change without notice. (2) * 52-FBGA package options are available for MX69N series

SLC NAND Flash MCP Packages

Update:2022/12/12

 Available	NAND	1Gb
	LPDDR2	512Mb
162-FBGA (8x10.5)		

Note: Roadmap information is subject to change without notice.

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e-MMC™ Solutions

e-MMC™ Flash Memory Roadmap

Update:2022/06/16

e-MMC™ Series

Key Features

- JEDEC Standard v5.1
- Vcc Range:
Vcc: 2.7 – 3.6V
Vccq: 2.7 – 3.6V / 1.7 – 1.95V
- HS200/HS400 mode
- Command Queuing
- Industrial temperature range

Process Node

19nm

Legend:

■ = Production phase



Note: (1) Roadmap information is subject to change without notice. (2) e-MMC™ is the trademark of JEDEC/MMCA. (3) 19nm is MLC NAND process

e-MMC™ Flash Memory Packages

Update:2022/06/16

 Available  Developing	2GB	4GB	8GB
153-FBGA (11.5x13)			
153-FBGA (11x10)			

Note: (1) Roadmap information is subject to change without notice. (2) e-MMC™ is the trademark of JEDEC/MMCA



Longevity Program

Longevity Program Statement

The Macronix Product Longevity Program (MPLP) is designed to provide customers with long-term availability of select Serial NOR, Parallel NOR and NAND Flash products for a period of up to 10 years, including an extended EOL period of 1 year for notification, and an additional year for final shipment.

A list of MPLP part numbers is provided as the link below:

<http://www.mxix.com.tw/en-us/support/Pages/product-longevity-program.aspx>

Given the long-term nature of the program, it may be necessary for Macronix to request customers to migrate devices in the program to newer process technologies or to an alternative manufacturing location. If a migration is requested, Macronix's goal is to provide the customer with a hardware and software compatible device for migration.

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