

Serial EEPROM, serial Flash and application specific serial non-volatile memories

Selection guide



February 2005

www.st.com/EEPROM
www.st.com/serialflash



Serial non-volatile memories - solutions for all design requirements

STMicroelectronics' serial NVM has become an industry benchmark, built with sub-micron technology and offering leading performance.

Standard serial EEPROM

Serial EEPROM is the most flexible type of non-volatile memory, featuring byte-level write without the need for an erase function before the write process. This makes the product ideal for parameter storage.

- Densities ranging from 1Kb to 1Mb
- 2.5 to 5.5V and 1.8 to 5.5V supply voltage ranges, with low power consumption
- Three industry standard serial buses: I²C, SPI and MICROWIRE[®]
- 1 million erase/write cycles as standard endurance
- More than 40 years data retention
- Devices offered in industrial and automotive temperature ranges
- Smallest footprints, including MSOP8, TSSOP8 and MLP8 (2x3mm) packages

ASM and custom requirements

Application-specific memories offer features either particular to a given application, or designed on request for specific purposes (custom products).

Serial Flash memories

ST's new high-density serial Flash memories are significantly faster than competitive Flash-based serial access solutions. Offering high system speed, sequential read capability, low power consumption, small packages and low-cost, they offer added value to both high and low-end applications.

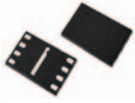
- Two sub-families:
 - Code storage "sector erase/page programming"
 - Data and parameter storage "page erase/page programming"
- Densities ranging from 512Kb to 64Mb for code storage, and from 1 to 16Mb for data and parameter storage
- 2.7 to 3.6V supply voltage range
- SPI industry-standard serial bus featuring a clock speed up to 50MHz
- Devices available in industrial and automotive temperature ranges
- Smallest footprints, including S08 and MLP packages

Firmware hub and low pin-count solutions

ST's firmware hub and low pin-count memories are optimized solutions for storing the BIOS content for most of today's desktops, servers and laptops. ST Flash memories represent the broadest range available: Flash memories compatible with Intel chipsets, legacy-free PC chipsets or those including a dual interface.

- Densities ranging from 4 to 16Mb
- 3.0 to 3.6V supply voltage range
- PLCC32, TSOP40 and TSOP32 packages

Serial EEPROM and serial Flash package options



	MLP 2x3 (mm)
Body width	2
Body length	3
Body thickness	0.55
Pitch	0.5



	MSOP8 (mm)
Body width	3
Body length	3
Body thickness	1.1
Pitch	0.65



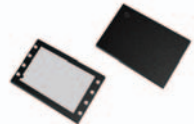
	TSSOP8 (mm)
Body width	4.5
Body length	3.1
Body thickness	1.2
Pitch	0.65



	SO8N (mm)
Body width	4.0
Body length	5.0
Body thickness	1.75
Pitch	1.27



	MLP 5x6 (mm)
Body width	5
Body length	6
Body thickness	0.9
Pitch	1.27



	MLP 6x8 (mm)
Body width	6
Body length	8
Body thickness	0.9
Pitch	1.27



	SO8W (mm)
Body width	5.4
Body length	5.35
Body thickness	2.03
Pitch	1.27



	S016W (mm)
Body width	7.6
Body length	10.5
Body thickness	2.65
Pitch	1.27



	PDIP8 (mm)
Body width	7.11
Body length	10.16
Body thickness	5.33
Pitch	2.54



	PLCCC32 (mm)	TSOP (mm)	TSOP32 (mm)
Body width	12.6	10.1	8.1
Body length	15.1	20.2	14.2
Body thickness	2.41	1.2	1.2
Pitch	1.27	0.5	0.5

All these packages use ST's ECOPACK® lead-free technology for RoHS compliance (the EU's directive on use of hazardous substances).

Note: Packages not to scale

Serial EEPROM applications

EEPROM storing parameters are everywhere



Automotive

- Engine management
- Transmission
- Dashboard
- Car radio
- Body electronics
- ABS/ESP
- Airbag
- Telematics/multimedia
- Navigation
- Car entertainment



Industrial

- Instrumentation
- Power/gas meters
- Alarms
- Programmable controllers
- Oscilloscopes
- Motor control
- Home appliances



Communications

- WLAN Wifi
- Cordless phones
- Line cards
- Networking and base stations
- Fax machines
- Mobile
- Corded phones
- Bluetooth
- Digital answering machine



Consumer

- Set-top boxes
- TV/Digital TV
- Remote control
- Audio, MP3
- VCR/DVD
- White goods
- Monitor
- Camcorders

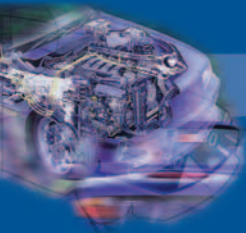


Computers

- Hard disk drives
- Printers
- Graphics cards
- DRAM modules
- CD/DVD ROM
- Motherboards
- Modems
- Computer peripherals:
 - Webcams
 - Keyboards
 - Wireless optical mice

Serial Flash applications

Serial Flash and Flash PC BIOS storing code, data and parameters encompass all applications



Automotive

- GPS mapping units
- Dashboard: executable code
- Car radio: executable routines called by OS stored in MCU (ROM)



Consumer

- Voice recorder/answering machines
- Learning remote controls
- Talking toys
- Video game scoring
- Digital cameras
- PDAs
- MP3 recorders
- DVD players
- Set-top boxes
- Digital TV
- Cameras
- Flat panel displays



Computers

- Graphics cards
- LAN cards and networking
- SCSI cards
- Control of disk drive (code storage and some parameters)
- Hard disk drives (HDD)
- CD-ROMs
- CD/read/read-write
- FWH and LPC specifications



Communications

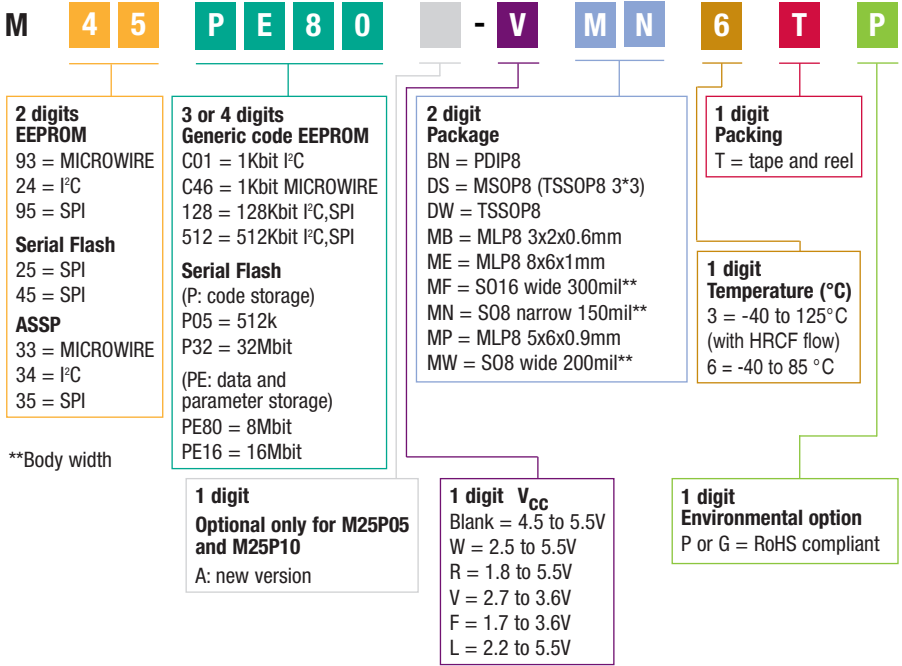
- Voice recorders (DECT)
- Pagers
- Fax machines
- Base stations



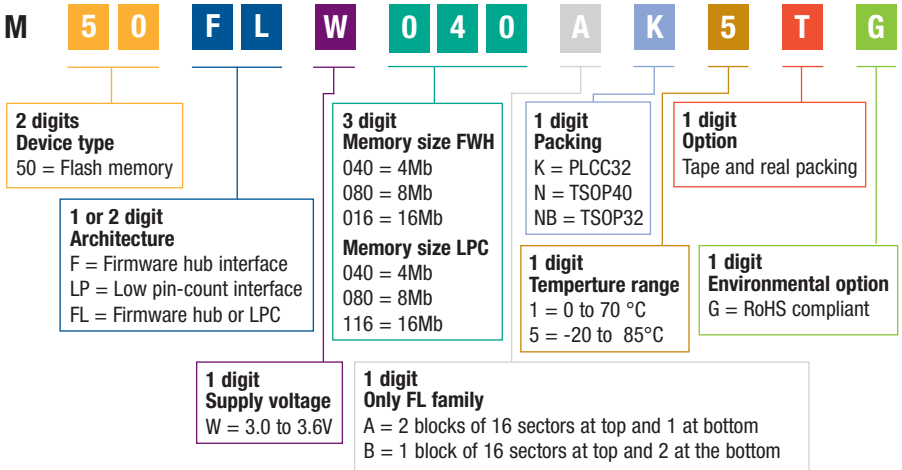
Industrial

- Signature recognition
- Instrumentation
- Portable data loggers
- Smart keyboards
- Historical storage and traceability

Serial EEPROM and serial Flash part numbering scheme



Flash for PC/server BIOS part numbering scheme



I²C serial EEPROM

Voltage range: W: 2.5 to 5.5V, R: 1.8 to 5.5V

Size	Reference	Description	V _{cc} range	Packages
1Kb	M24C01	1Kb (x8), 400KHz*, 5**ms write time, 3 chip enable	W, R	PDIP8, SO8, TSSOP8, MSOP8
2Kb	M24C02	2Kb (x8), 400KHz*, 5ms** write time, 3 chip enable	W, R	PDIP8, SO8, TSSOP8, MSOP8, MLP2X3***
4Kb	M24C04	4Kb (x8), 400KHz*, 5ms** write time, 2 chip enable	W, R	PDIP8, SO8, TSSOP8, MSOP8
8Kb	M24C08	8Kb (x8), 400KHz*, 5ms** write time, 1 chip enable	W, R	PDIP8, SO8, TSSOP8, MSOP8, MLP2X3***
16Kb	M24C16	16Kb (x8), 400KHz*, 5ms** write time, no chip enable	W, R	PDIP8, SO8, TSSOP8, MSOP8,
32Kb	M24C32	32Kb (x8), 400KHz*, 5ms** write time, 3 chip enable	W, R	PDIP8, SO8, TSSOP8
64Kb	M24C64	64Kb (x8), 400KHz*, 5ms** write time, 3 chip enable	W, R	PDIP8, SO8, TSSOP8
128Kb	M24128B	128Kb (x8), 400KHz*, 5ms** write time, 3 chip enable	W, R	PDIP8, SO8, TSSOP8
256Kb	M24256B	256Kb (x8), 400KHz*, 10ms write time, 3 chip enable	W, R	PDIP8, SO8, TSSOP8
512Kb	M24512	512Kb (x8), 400KHz*, 10ms write time, 3 chip enable	W	PDIP8, SO8, TSSOP8
1Mb	M24M01	512Kb (x8), 400KHz*, 10ms write time, 3 chip enable	W	SO8N

* Clock speed is 100KHz for R versions, ** Write time is 10ms for R versions, *** Contact marketing for availability

SPI serial EEPROM

Voltage range: W: 2.5 to 5.5V, R: 1.8 to 5.5V

Size	Reference	Description	V _{cc} range	Packages
1Kb	M95010	1Kb (x8), 10MHz*, 5ms write time, block protection	W, R	PDIP8, SO8, TSSOP8
2Kb	M95020	2Kb (x8), 10MHz*, 5ms write time, block protection	W, R	PDIP8, SO8, TSSOP8
4Kb	M95040	4Kb (x8), 10MHz*, 5ms write time, block protection	W, R	PDIP8, SO8, TSSOP8
8Kb	M95080	8Kb (x8), 10MHz*, 5ms write time, block protection	W, R	PDIP8, SO8, TSSOP8
16Kb	M95160	16Kb (x8), 10MHz*, 5ms write time, block protection	W, R	PDIP8, SO8, TSSOP8, MLP2X3***
32Kb	M95320	32Kb (x8), 10MHz*, 5ms write time, block protection	W, R	PDIP8, SO8, TSSOP8, MLP2X3***
64Kb	M95640	64Kb (x8), 10MHz*, 5ms write time, block protection	W, R	PDIP8, SO8, TSSOP8
128Kb	M95128	128Kb (x8), 10MHz*, 5ms write time, block protection	W, R	PDIP8, SO8, TSSOP8*
256Kb	M95256	256Kb (x8), 10MHz*, 5**ms write time, block protection	W, R	PDIP8, SO8, TSSOP8*
512Kb	M95512	512Kb (x8), 10MHz*, 5**ms write time, block protection	W, R	PDIP8, SO8, TSSOP8*

* Clock speed is 5MHz for W version, ** Write time is 10ms for R version, *** Contact marketing for availability

MICROWIRE® serial EEPROM

Voltage range: W: 2.5 to 5.5V, R: 1.8 to 5.5V

Size	Reference	Description	V _{cc} range	Packages
1Kb	M93C46	1Kb (x8/x16), 2MHz, 5ms write time*	W, R	PDIP8, SO8, TSSOP8, MSOP8
1Kb	M93S46	1Kb (x16), 2MHz, 5ms write time*, block write protection	W, R	PDIP8, SO8 TSSOP8, MSOP8
2Kb	M93C56	2Kb (x8/x16), 2MHz, 5ms write time*	W, R	PDIP8, SO8 TSSOP8, MSOP8
2Kb	M93S56	2Kb (x16), 2MHz, 5ms write time*, block write protection	W, R	PDIP8, SO8 TSSOP8, MSOP8
4Kb	M93C66	4Kb (x8/x16), 2MHz, 5ms write time*	W, R	PDIP8, SO8 TSSOP8, MSOP8
4Kb	M93S66	4Kb (x16), 2MHz, 5ms write time*, block write protection	W, R	PDIP8, SO8 TSSOP8, MSOP8
8Kb	M93C76	8Kb (x8/x16), 2MHz, 5ms write time*	W, R	PDIP8, SO8 TSSOP8, MSOP8
16Kb	M93C86	16Kb (x8/x16), 2MHz, 5ms write time*	W, R	PDIP8, SO8 TSSOP8, MSOP8

*Clock speed is 1MHz and write time is 10ms for R version

ASM (application-specific memories)

ASMs are built on a common non-volatile technology platform, allowing multiple memory types - EPROM, Flash, EEPROM - to be combined on-chip, together with various interfaces (I²C, SPI, MICROWIRE), RF contactless access, or customized interfaces.

Voltage range: W: 2.5 to 5.5V, L: 2.2 to 5.5V, R: 1.8 to 5.5V, F: 1.7 to 3.6V

Size	Reference	Description	V _{cc} range	Packages
384b	M34C00	3 x128b serial I ² C for e-Tags	W	SO8, TSSOP8
2Kb	M34C02	2Kb (x8), serial I ² C for DIMM serial presence detect	L, R	SO8, TSSOP8, MSOP8, MLP2X3*
2Kb	M34E02	2Kb (x8), serial I ² C for DIMM serial presence detect	F**	TSSOP8, MLP2X3*
4Kb	M34F04	4Kb, (x8), half memory protection features	W	SO8
64Kb	M34D64	64Kb, (x8), 400KHz, hardware WC top memory quarter	W, R	SO8, TSSOP8

* Contact marketing for availability

** Temperature range: 0° to 70° only

High-speed low-voltage serial Flash memories

The M25P family of serial Flash for code storage

Voltage range: V: 2.7 to 3.6V

Size	Reference	Description	Packages
512kB	M25P05-AV	2x 256Kb sectors, sector erasable, 512kb (x8), 40MHz,	MLP, SO8
1Mb	M25P10-AV	4x256Kb sectors, sector erasable, 1Mb (x8), 40MHz,	MLP, SO8
2Mb	M25P20-V	4x512Kb sectors, sector erasable, 2Mb (x8), 40MHz,	MLP, SO8
4Mb	M25P40-V	8x512Kb sectors, sector erasable, 4Mb (x8), 40MHz,	MLP, SO8
8Mb	M25P80-V	16x512Kb sectors, sector erasable, 8Mb (x8), 40MHz,	MLP, SO8W, S016W
16Mb	M25P16-V	32x512Kb sectors sector erasable, 16Mb (x8), 50MHz,	MLP, S016W
32Mb	M25P32-V	64x512Kb sectors ,sector erasable, 16Mb (x8), 50MHz,	MLP, S016W
64Mb	M25P64-V	128x512Kb sectors, sector erasable, 16Mb (x8), 50MHz,	MLP, S016W

The M45PE and M25PE families of serial Flash for data and parameter storage

M45PE family with specific SPI pin-out

Voltage range: V: 2.7 to 3.6V

Size	Reference	Description	Packages
1Mb	M45PE10-V	Page erasable, 1Mb (x8), 25MHz, 2 sectors, 256 byte page	MLP,SO8
2Mb	M45PE20-V	Page erasable, 2Mb (x8), 25MHz, 4 sectors, 256 byte page	MLP,SO8
4Mb	M45PE40-V	Page erasable, 4Mb (x8), 25MHz, 8 sectors, 256 byte page	MLP,SO16W
8Mb	M45PE80-V	Page erasable, 8Mb (x8), 25MHz, 16 sectors, 256 byte page	MLP,SO16W

* Contact marketing for availability

M25PE family with standard SPI pin-out (EEPROM alike) and other features

Size	Reference	Description	Packages
1Mb	M25PE10-V	Page erasable, 1Mb (x8), 25MHz, 2 sectors, 256 byte page	MLP,SO8
2Mb	M25PE20-V	Page erasable, 2Mb (x8), 25MHz, 4 sectors, 256 byte page	MLP,SO8
4Mb	M25PE40-V	Page erasable, 4Mb (x8), 25MHz, 8 sectors, 256 byte page	MLP,SO16W
8Mb	M25PE80-V	Page erasable, 8Mb (x8), 25MHz, 16 sectors, 256 byte page	MLP,SO16W*

* Contact marketing for availability

M50 family PC BIOS Flash for code storage

Voltage range: W: 3.0 to 3.6V

Size	Reference	Description	Packages
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Firmware hub Flash

4Mb	M50FW040	(x8), 8 blocks (8x64K) bytes	PLCC32, TSOP40
8Mb	M50FW080	(x8), 16 blocks (16x64K) bytes	PLCC32, TSOP40, TSOP32
16Mb	M50FW016	(x8), 32 blocks (32x64K) bytes	TSOP40

Low pin-count Flash

4Mb	M50LPW040	(x8), 8 blocks (8x64K) bytes	PLCC32, TSOP40
8Mb	M50LPW080	(x8), 16 blocks (16x64K) bytes	PLCC32, TSOP40
16Mb	M50LPW116	(x8), 32 blocks - top boot (16K+8K+8K+32K) + (30x64K) + (16x4K) bytes	TSOP40

Dub interface FHW and LPC Flash

4Mb	M50FLW040A/B*	Top: 2 blocks of 16 uniform sectors of 4KByte 5x64 KByte Bottom: 1 block of 16 uniform sectors of 4KByte	TSOP40, TSOP32, PLCC32
8Mb	M50FLW080A/B*	5x64 KByte Bottom: 2 blocks of 16 uniform sectors of 4KByte	PLCC32, TSOP40, TSOP32

**A" = 2 x top, 1 x bottom blocks. "B" = 1 x top, 2 x bottom blocks

Serial Flash application notes

Document	Release date	Description
AN1995	15-Jul-2004	Serial Flash memory device marking
AN1579	28-May-2003	Compatibility between SO8 and MLP packages for the M25Pxx
AN1432	20-Sep-2002	Write protection and code storage
AN1511	16-Mar-2002	Ensuring compatibility between M25P10 to M25P10-A and M25P05 to M25P05-A

Serial EEPROM application notes

Document	Release date	Description
AN1001	01-Jan-2001	Understanding bus differences in order to choose serial EEPROMs
AN1292	22-Nov-2001	How to make an application-specific memory
AN1571	24-Sep-2002	Replacing the M93C06 by the M93C46
AN1120	03-Dec-2002	EEPROM-based application-specific memories
AN1471	02-Sep-2004	What happens to the M24xxx I ² C EEPROM if I ² C bus communication fails?
AN394	01-Jan-2001	MICROWIRE EEPROM common I/O operation
AN995	01-Jan-2001	Changing from the ST24xxx and ST25xxx to the M24xxx
AN1436	01-Jun-2001	Changing from the ST95010/ST95020 to the M95010/M95020 using a simple recognition method
AN627	01-Jan-2001	Serial EEPROM compatible with plug-and-play VESA display data channel (Versions 1.0 and 2.0)
AN1119	11-Oct-2001	Correct power-on and power-off for the M93Cxx and M93Sxx
AN1470	09-Nov-2001	Changing from the M24256-A to the M24256-B
AN2043	Nov-2004	Serial EEPROM device marketing

Serial non-volatile memories application notes

Document	Release date	Description
AN2065	Nov-2004	Serial non-volatile memories marketing codes

Serial Flash memory M25P/45PE USB evaluation programmer/reader

ST's USB evaluation programmer/reader is a convenient tool to evaluate the M25P and M45PE serial Flash. This programmer is PC-driven (configured with the Install package) and allows the developer to control and access all serial Flash devices in any configuration. To obtain aM25P/M45PE USB evaluation programmer/reader, please contact your local STMicroelectronics sales office.



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Full product information at www.st.com

Order code: SGEEFLASH/1204

