



# Spansion® FL-S Serial NOR Flash Memory

## 8x Faster Program Performance for Increased Factory Throughput and Lower Overall System Cost

The Spansion® FL-S family of 3V Serial NOR Flash memory is fabricated on 65 nm MirrorBit® charge trapping technology. These devices offer a Fast Read command clock speed of up to 133 MHz in Single I/O mode and up to 104 MHz in Dual or Quad I/O mode. In addition, the FL-S family of devices supports clock speeds of up to 66 MHz in DDR mode, offering an equivalent read throughput of 66 MB/s. The FL-S family features a write buffer that allows up to 128 words (256-bytes) or 256 words (512-bytes) to be programmed in one operation, resulting in faster effective programming (up to 1.5 MB/s) than standard SPI programming algorithms. The FL-S family of products offers higher densities coupled with the flexibility and fast performance required by a variety of embedded applications. They are ideal for code shadowing, executing code directly from flash (XIP), and data storage.

### KEY FEATURES

- 128 Mb - 1 Gb
- 65 nm MirrorBit Charge-Trapping Technology
- 66 MB/s read performance (DDR)
- 1.5 MB/s program performance
- 500 KB/s erase performance
- Industry-standard SOIC, WSON and BGA packages
- Wide temperature ranges
  - Industrial (-40°C to +85°C)
  - Automotive in-cabin (-40°C to +105°C)
- Complementary drivers & Spansion Flash file system (FFS)

### SUITABLE APPLICATIONS

- Automotive
- Consumer Electronics
- Industrial
- Medical
- Networking
- Telecommunications

### DATASHEET SUMMARY

- 65 nm MirrorBit Charge Trapping Technology
- Single supply ( $V_{CC}$ ) for read / program / erase (2.7V to 3.6V)
- Versatile I/O Feature
  - Wide I/O voltage range ( $V_{IO}$ ): 1.65V to  $V_{CC}$
- x1, x2, x4 bus width
- 256-byte or 512-byte Programming Buffer
  - Programming in Page multiples, up to a maximum of 512 bytes
- Sector Erase
  - Hybrid sector size option - physical set of thirty two 4-kbytes sectors at top or bottom of address space with all remaining sectors of 64 kbytes
  - Uniform 256 Kbytes sector option for software compatibility with higher density and future devices
- Suspend and Resume commands for Program and Erase operations
- Software and Hardware Reset
- Extended Addressing: 24- or 32-bit address options
  - Multi I/O command set and footprint compatible with S25FL-P family

- Advanced Sector Protection (ASP)
  - Individual sector protection controlled by boot code or password
  - Volatile and non-volatile register bits for more configurable flexibility
- Separate 1024-byte One Time Program (OTP) array with thirty-two individually lockable regions
  - 128-bit Unique ID
- Common Flash Interface (CFI) parameter table for configuration information
- Industrial temperature range (-40°C to +85°C)
- Automotive in-cabin temperature range (-40°C to +105°C)
- 100,000 erase cycles for any sector typical
- 20-year data retention typical
- Packaging Options (Pb-free)
  - 16-pin SOIC
  - 8-contact WSON, 6 mm x 8 mm
  - 24-ball BGA, 6 mm x 8 mm

## MAXIMIZE YOUR SYSTEM PERFORMANCE

The Spansion FL-S was designed to provide higher performance while supporting backwards compatibility to the FL-P products. Implementing the recommended software modifications for the FL-S will provide the optimal system performance.

	SPANSION FL-P	SPANSION FL-S	COMMENTS
<b>READ THROUGHPUT*</b>	40 MB/s	66 MB/s	Utilizing the DDR mode of the Spansion FL-S yields the highest read throughput.
<b>PROGRAM THROUGHPUT*</b>	0.17 MB/s	1.5 MB/s	By using the uniform 256-kbyte sector configuration, the programming operations use the full, larger 512-byte write buffer of the Spansion FL-S yielding higher programming throughput. For the very best performance, programming should be done in full pages of 512 bytes aligned on 512 byte boundaries with each Page being programmed only once.
<b>ERASE THROUGHPUT*</b>	0.13 MB/s	0.5 MB/s	FL-S provides over 3x improvement in erase performance compared to FL-P.

\* Maximum values listed for read, program and erase throughput.

## MIGRATION NOTES

FEATURE	SPANSION FL-P (Multi I/O)	SPANSION FL-S	
<b>COMMON FLASH INTERFACE (CFI)</b>	Yes	Yes (extended)	The Spansion FL-S supports an extended address range revision of CFI.
<b>PROGRAM BUFFER SIZE</b>	256 bytes	256 bytes or 512 bytes	Designs that use the uniform 256 KB sector option will be automatically configured with the 512-byte page programming buffer.
<b>OTP</b>	506 bytes	1024 bytes	FL-S provides more OTP along with a factory pre-programmed 128-bit random ID per device.
<b>8-KBYTE SECTOR ERASE</b>	Yes	No	Command for erasing an 8-kbyte area (two 4-kbyte sectors) is not supported on FL-S.
<b>4-KBYTE SECTOR ERASE</b>	Yes	Yes	Command for erasing a 4-kbyte sector is supported only in the 128-Mbit and 256-Mbit density FL-S devices and only with the uniform 64-kbyte sector configuration.
<b>DEEP POWER DOWN</b>	Yes	No	The legacy Deep Power Down function is not supported on the FL-S devices. Instead, the legacy DPD (B9h) command code is used to enable legacy SPI memory controllers that can issue the former DPD command, to access a new bank register that enables access to the larger address space of 256-Mbit or higher densities.

## ORDERING PART NUMBER GUIDE

Prefix	Series	Family	Density	Tech	Speed	Package	Temp	Model Number	Pack type
S	2 5	F L	2 5 6	S	A G	M F	I	0 1	3
Prefix S = Spansion	Series 25 = SPI Flash 70 = Dual Die Package SPI Flash	Family FL = 3V Serial	Density 128 - 512 = 128 Mb-512 Mb 01G = 1 Gb	Tech S = 65 nm MirrorBit (Eclipse)	Speed Option AG = 133 MHz DP = 66 MHz DDR	Package MF = 16-pin SOIC, Pb- Free NF = 8-contact WSON, Pb- Free BH = 24-ball BGA 6 x 8 mm, Low-Halogen, Pb-Free	Temperature Grade I = Industrial Temp (-40°C to +85°C) V = In Cabin (-40°C to +105°C)	Model Number See the FL-S data sheets for model numbering that allows options for package configuration, DDR, sector type, RESET#, and V <sub>IO</sub> support.	Packaging Type 0 = Tray, 1 = Tube 3 = 13" Tape and Reel

### MIGRATING FROM SPANSION FL-P TO THE FL-S FAMILY?

Key design and support resources are offered at [www.spansion.com](http://www.spansion.com) in the solutions section.

Spansion: 915 DeGuigne Drive, PO Box 3453, Sunnyvale, CA 94088-3453 USA  
+1 (408) 962-2500 | 1866 SPANSION | [www.spansion.com](http://www.spansion.com)

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