Spansion MirrorBit
SPI Product Family

Spansion Flash memory products adopt a serial peripheral interface (SPI) that enables the miniaturization of board space as well as overall system cost reduction.

Introduction

Serial Peripheral Interface (SPI) Flash memory is rapidly gaining acceptance for code storage and other non-volatile memory applications. The Serial Peripheral Interface (SPI) enables a reduced ASIC or controller pin count, resulting in smaller packages that use less board space for overall system cost savings. It is an ideal solution for integrating Flash memory into:

- PC peripherals devices such as optical and hard disk drives, LCD monitors, printers, copiers, fax machines, and PC BIOS
- Communication and networking devices such as DSL modems, cable modems, cordless phones, and wireless LAN
- Digital consumer electronics such as DVD players/recorders, GPS, Set-Top Box, automotive entertainment, and game platforms

Now Spansion has developed a series of SPI Flash memory solutions with market-leading performance, density range, and packaging options. As the largest company exclusively devoted to developing, designing, and manufacturing Flash memory, Spansion has the critical market mass to deliver competitive product supply options. Spansion also collaborates with leading chipset vendors to accelerate the adoption of SPI Flash memory. Fig. 1 presents the features of SPI Flash memory.

Overview of SPI Flash Memory

SPI solutions transfer data one bit at a time, rather than sending eight, 16-, or 32-bit in parallel. As a result, solutions require fewer connections and pins per package, which simplifies design, lowers cost and reduces form factors. SPI devices are therefore well suited for cost- and space-constrained applications.

Broad Product Portfolio

Densities for Spansion MirrorBit SPI Flash memory devices range from 4M-bit to 64M-bit with uniform 64K-byte sectors, (all of which are in production today.) and 128M-bit with Uniform 64K-byte or Uniform 256K-byte sectors. The 4M-bit device is also offered with boot/parameter sectors. Table 1 shows the product lineup.

Leading Performance for Fast Boot Times

Today’s embedded applications demand performance, and Spansion delivers as the first vendor to offer lightening-fast operating frequencies up to 104MHz for 128M-bit and 50MHz...
across densities from 4M-bit to 64M-bit. Fast clock speed allows product users to enjoy faster boot times, a key differentiating feature for end customers in highly competitive embedded product markets.

**Low Power Consumption for Portable Devices**

Battery-powered handheld devices require power-efficient components. Spansion delivers again with Deep Power Down mode. This energy-saving mode allows the device to draw the lowest current (1.5 µA Typ.), enabling system designers to satisfy tight power budgets. Combined with the small form factor of the Serial interface, low power consumption makes Spansion SPI Flash memory an ideal solution for portable products such as PDAs, GPS, gaming devices, and cordless phones.

**Features**

- Based on award-winning MirrorBit technology
- Fast read performance in the industry (4M-bit to 64M-bit: 50MHz, 128M-bit: 104MHz)
- Single power-supply operation: 2.7V to 3.6V read, program, and erase operations
- Low power operation with Deep Power Down mode: 1.5 µA (Typ.)
- Fast programming time with 1.5ms/page (page size: 256bytes)
- Industry-standard pinpoint and command set
- Multiple package offering in lead-free: SOIC and WSON/USON
- 100,000 erase cycles typical per sector
- Ambient operating temperature –40°C to +85°C
- Hardware/Software write protect
- Seamless migration across densities using same package, pinout and commands

**Ultra-Slim SPI package**

Spansion takes efficient SPI packaging a step further with ultra-slim 0.5mm height USON packages. These advanced packages have no leads, making them ideal for micro hard disk drives in popular portables devices such as MP3 players and cellular handsets.

Spansion is promoting an industry standard package, command set, and pinout with multiple second sources. Packaging options include 8-pin SOIC (4 to 16M-bit), 16-pin SOIC (16 to 128M-bit) and 8-contact SON (4 to 16M-bit, 128M-bit). To help reduce lead in our environment, Spansion offers lead-free* materials for all packages with RoHS compliance.

Fig. 2 shows the pinout.

**Superior Quality, Reliability, and Service**

Spansion SPI Flash memory is backed by a reputation for superior reliability built on more than 20 years of experience. All Spansion manufacturing facilities are ISO certified and maintain the highest level of process control, testing, and package quality.

Spansion’s support organization has unparalleled expertise in servicing the needs of customers. They go beyond technical support to solve unique integration problems in the areas of software and board design.

**128M-bit MirrorBit SPI Flash Memory with Industry-Leading 104MHz Performance**

128M-bit MirrorBit SPI is the industry’s highest performing SPI Flash memory with 104MHz clock speed. The 128M-bit MirrorBit SPI device maintains packages with consistent pinouts—the Universal Footprint—that allow users to migrate from lower to higher density serial Flash memory without having to alter board layouts.

The Universal Footprint gives manufacturers the efficiency to develop solutions based on a single platform and leverage their hardware and software designs across multiple product lines,

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**Table 1 Product Lineup**

<table>
<thead>
<tr>
<th>Product</th>
<th>Capacity</th>
<th>Clock speed</th>
<th>Voltage</th>
<th>Sector architecture</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>S25FL040A</td>
<td>4M-bit</td>
<td>50MHz</td>
<td>2.7 to 3.6V</td>
<td>Uniform 64Kbytes</td>
<td>SOIC-8, USON-8</td>
</tr>
<tr>
<td>S25FL008A</td>
<td>8M-bit</td>
<td>50MHz</td>
<td>2.7 to 3.6V</td>
<td>Uniform 64Kbytes</td>
<td>SOIC-8</td>
</tr>
<tr>
<td>S25FL016A</td>
<td>16M-bit</td>
<td>50MHz</td>
<td>2.7 to 3.6V</td>
<td>Uniform 64Kbytes</td>
<td>SOIC-8, SOIC-16, WSON-8</td>
</tr>
<tr>
<td>S25FL032A</td>
<td>32M-bit</td>
<td>50MHz</td>
<td>2.7 to 3.6V</td>
<td>Uniform 64Kbytes</td>
<td>SOIC-16</td>
</tr>
<tr>
<td>S25FL064A</td>
<td>64M-bit</td>
<td>50MHz</td>
<td>2.7 to 3.6V</td>
<td>Uniform 64Kbytes</td>
<td>SOIC-16</td>
</tr>
<tr>
<td>S25FL128P</td>
<td>128M-bit</td>
<td>104MHz</td>
<td>2.7 to 3.6V</td>
<td>Uniform 64Kbytes Uniform 256Kbytes</td>
<td>SOIC-16, WSON-8</td>
</tr>
</tbody>
</table>

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*Features include lead-free materials for all packages with RoHS compliance.*
quickening their time-to-market with innovative solutions.

Spansion also offers an ×8 Parallel mode to speed up factory programming throughput and lower costs. The 128M-bit MirrorBit SPI solution part number is S25FL128P, and is available in industry-standard 16-pin SOIC as well as WSON 6×8 packages with EU RoHS compliance*1 and the option of standard materials.

**Spacious System Designing**

Spansion also offers hardware and software support to help customers quickly design Spansion SPI Flash memory devices into embedded products:

- The Spansion USB Programmer (SUP) is a cost-effective single-device Flash memory programmer, perfect for in-field verification and failure testing. Customers can use SUP to program and verify Spansion Flash memory using the USB port of a PC running the Microsoft® Windows® PC.
- The SPI Low Level Driver (sLLD) is a free pre-tested, production-grade driver that easily integrates with any embedded system. This helps customers get their products to market faster, while also lowering their development risk and cost.
- Programmer Support offers free pre-integrated and custom system-level solutions. From file systems and device drivers, to application notes and design guides, Spansion is dedicated to supporting software development teams.
- CAD Modeling Software is available at www.spansion.com, where system designers can find a wide range of simulation models based on industry standard including IBIS, VHDL, and Verilog.

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### SPI Flash Memory in Spansion

Spansion SPI Flash memories will enable realization of the world’s highest-quality products. Superlative support from the world’s top system engineer specialists will also continue to be provided.

- Broad portfolio of SPI products from 4M-bit to 128M-bit
- Industry’s fastest clock speed across all densities from 4M-bit to 64M-bit SPI Flash Memory (50MHz/104MHz)
- Ultra-slim 0.50mm height USON Packages (at some densities)

**Fig.3** shows roadmap of MirrorBit SPI products.

For more information related to Spansion SPI Flash memory solutions, please visit the Spansion web site:

http://www.spansion.com/jp

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**NOTES**

*1: EU RoHS—The European Union Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2004 (“the EU RoHS Regulations”). To be EU RoHS compliant, a maximum concentration value not greater than 0.1% by weight in homogeneous materials for lead, mercury, hexavalent chromium, PBB and PBDE and not greater than 0.01% by weight in homogeneous materials for cadmium will be permitted in the manufacture of new EEE (Electrical and Electronic Equipment).

* Microsoft Windows is a registered trademark of the U.S. Microsoft Corporation in the U.S. and other nations.

* Other company names and brand names are the trademarks or registered trademarks of their respective owners.

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**Figure 2** Pin Assignments

![Pin Assignments](image-url)
Figure 3 Roadmap of SPI Products

<table>
<thead>
<tr>
<th>Size</th>
<th>Process</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tr>
<td>4M-bit</td>
<td></td>
<td>S25FL064A</td>
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<tr>
<td>8M-bit</td>
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<td>S25FL088A</td>
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<td></td>
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<tr>
<td>16M-bit</td>
<td></td>
<td></td>
<td>S25FL016A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32M-bit</td>
<td>200nm</td>
<td></td>
<td></td>
<td>S25FL032A</td>
<td>ES 2Q08</td>
<td>CS 3Q08</td>
</tr>
<tr>
<td></td>
<td>90nm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64M-bit</td>
<td>200nm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>90nm</td>
<td></td>
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</tr>
<tr>
<td>128M-bit</td>
<td>90nm</td>
<td></td>
<td></td>
<td>ES Mar 07</td>
<td>CS Jun 07</td>
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</table>

- 50MHz clock speed (FL-A)
- 104MHz clock speed (FL-P)
- Uniform sector structure [uniform only for 4M-bit, boot (Top/Bottom)]
- Single power-supply 2.7 to 3.6V
- 256 bytes page size
- Deep power-down function

* Please note that this schedule may change without notice.