

Samsung Smart Memory

Experience the breakthrough performance
of Samsung Smart Memory Solutions

The New Era of Smart Memory has Arrived



Offer always-on connection with high performance and less energy.

Delivering peak performance to meet the demands of today's mobile world

Advances in mobile device technology are moving at an incredibly fast pace, driven by consumers who demand better performance and superior mobile experiences from the devices that they use every day. Consumers want to be able to do more multitasking, at a faster pace without any lag time. They also want to run more complex, storage-intensive applications and view content with improved image quality and higher resolution. All of this functionality needs to be supplied on a mobile device that is slim enough to carry around, yet can be operated for a long time on battery power to allow users to continue their tasks while on the move.

Some might think that these factors come together easily, but each factor advances on an entirely different front. Fortunately, there is a critical component that brings everything together. The superior performance, battery life and smaller form factor of mobile devices are all enabled by the advancement of a key technology within the device: the memory chip. As the powerhouse and brain of a mobile device, improvements in the memory chip provide the enhanced mobile experience that consumers want.

Device manufacturers are continually challenged to make faster, more energy-conserving mobile devices in smaller sizes to keep pace with consumers' always-on, always-connected lifestyle.

Samsung Smart Memory: The solution for a smarter mobile life

To accommodate the rising demand for superior memory, Samsung has researched and developed its own offering of advanced memory, covering the need for greater mobility and less energy consumption in a wide variety of mobile devices. From smartphones and tablets to notebook PCs, Samsung Smart Memory offers performance, energy-efficiency and an ultra-slim size crucial to the advanced smart devices that consumers use constantly. Featuring the highest-quality chips, Samsung delivers Smart Memory with improved features that more than satisfy the needs of consumers.

Equipped with Smart Memory, mobile devices have these key characteristics:

- **High performance.** Superior computing speeds, faster response and higher resolution enable consumers to enjoy similar performance to using desktop PCs.
- **More power using less energy.** Users can perform multiple tasks longer on larger screens with increased standby time. These advantages empower people on the move to do more with their mobile devices between charges.
- **Smaller size.** The compact form factor is designed to fit into today's smaller handheld mobile devices demanded by consumers for enhanced portability and lighter weight.



Select from an array of Smart Memory fitted for today's slim mobile devices.

Greater performance and energy savings in a more compact size

Samsung Smart Memory comprises a comprehensive offering of memory products that play a key role in today's advanced, slim mobile devices. When powered by Smart Memory best-in-class memory chips, smartphones, tablets and notebook PCs provide uncompromised performance, reliability and energy savings in a compact size. Following are the memory products that Smart Memory offers to take mobile computing to the next-generation level of performance, efficiency and portability for today's increasingly mobile lifestyle.

Samsung LPDDR3

Samsung LPDDR3 mobile DRAM is high-speed, power-saving memory built specifically for smartphones and tablets. LPDDR3 provides higher bandwidth and greater density for superb graphic resolution, smooth streaming multimedia and instant-on, instant-play performance. Multitasking, longer standby, larger screen sizes and thinner profiles are also possible using LPDDR3 mobile DRAM. When choosing Samsung LPDDR3 memory, manufacturers gain the following exceptional design advantages while end users benefit from enhanced performance:

- **Reduced power consumption in standby mode.** Advanced on-chip technologies, such as temperature-compensated self-refresh (TCSR), enable a device to consume less power in standby mode without compromising performance. LPDDR3 provides longer battery life than current DDR3L memory. Plus, it does so while still remaining connected to email, social networks and synchronized data within the cloud.
- **Extended battery life in operational mode.** Users can experience reduced power consumption rates.
- **Additional power savings without sacrificing total density.** Manufacturers can move from a dual-die package to a monolithic chip while keeping the same total density with a power efficiency improvement at the component level.
- **High operational speeds.** Users can power through memory-demanding applications and multitasking functions at greater speeds. Plus, LPDDR3 supports a much higher bandwidth than previous-generation LPDDR2 memory.
- **Heightened performance.** LPDDR3 brings Full High Definition (FHD) viewing to virtually any mobile device.

- **Design flexibility.** Manufacturers have a choice of thin, small form-factor packages that use minimal board space. LPDDR3 occupies half a Printed Circuit Board's (PCB) space compared with LPDDR2 memory.

Samsung eMMC

Samsung embedded MultiMediaCard (eMMC) memory provides advanced, managed NAND flash for smartphones, tablets and notebook PCs, delivering power and high random write performance. eMMC supports high interface bandwidth to maximize sequential performance. As a result, users experience higher device-level and system-level multitasking performance. Samsung eMMC memory in mobile devices provides manufacturers and end users with the following features and benefits:

- **Faster time to market.** Samsung eMMC provides simplified system design and integration of both single-level cell (SLC) and multi-level cell (MLC) NAND memory.
- **Standard voltage-level operation.** The memory eliminates the need to develop or use separate firmware for the eMMC controller.
- **Industry-standard interface.** The industry-standard interface turns memory access into simple read and write operations with advanced security and reliability.
- **Extremely compact size.** The compact size of the memory frees up board space for other components, boasting a footprint typically smaller than a postage stamp.
- **Expanded computing power and content storage.** Samsung eMMC supports high-definition video playback and other high-end multimedia features such as 3D, plus enables instant on and play.



Provide best-in-class storage, speed and reliability in compact form.

Samsung SSDs

Samsung solid state drives (SSDs) provide best-in-class storage, speed and dependability. These powerful SSDs are much smaller than hard disk drives (HDDs) and typically perform better. With standby power requirements significantly less than HDDs, Samsung SSDs consume much less energy. Equipped with the company's smaller, lighter SSD memory components, notebook PCs can offer increased responsiveness and perform virtually all the same functions as cumbersome laptops. Samsung SSDs provide manufacturers and end users with the following key features and benefits:

- **Reduced energy consumption.** Low-power consumption in active and idle modes lengthens battery life and provides standby power reduction.
- **Faster read and write speeds.** Virtually noise-free operation when reading and writing at sequential and random rates.
- **Higher reliability and stability than HDDs.** Unlike HDDs, SSDs have no moving parts requiring maintenance, repair or replacement.
- **Exceptional durability.** High-shock and vibration tolerance levels make Samsung SSDs ideal for all types of mobile devices.
- **Outstanding multitasking capabilities.** Accelerated read and write operations enable powerful multitasking capabilities.
- **Varied interfaces.** Connections to different types of devices are made possible with varied interfaces.
- **Quality end-to-end integration.** Superior integration is assured because Samsung manufactures all components, including NAND flash memory chips, controllers, firmware and DRAM on its own fabrication lines.
- **High storage capacity.** SSDs can replace HDDs to increase storage densities, reduce costs and lower power consumption.

- **Affordable, cost competitiveness.** Second-generation 3-bit MLC SSDs are affordable, yet deliver superior-level user experience by enhancing random performance.

Samsung eMCP (eMMC-based MCP)

The Samsung Multi-Chip Package (MCP) innovative chip-stack design optimizes PCB space to fit in a broad range of slim-profile mobile devices. Built with Samsung's low-power flash and DRAM memory technology, these MCPs are extremely energy-efficient. With minimized power consumption, a small size and high-memory density, Samsung MCP solutions are well suited to support powerful multimedia apps and wireless Internet connections. The compact packages are designed to satisfy the demands that today's consumers expect from their portable devices. Samsung eMCPs provide:

- **Small size.** Manufacturers can save board-space by stacking several memory chips vertically.
- **High-memory density for enhanced memory and overall system performance.** Tight coupling and close positioning of memory modules establish the shortest interconnections possible in a small, high-density package.
- **Lower costs with accelerated time to market.** Rapid integration of MCP modules speeds the pace of product development. With simplified manufacturing and faster time to market, manufacturers can save significantly on cost.
- **Easy scaling.** Consistent use of packaging and footprint simplifies scaling between different Samsung MCP combinations.
- **Highly advanced process technologies.** Includes 20nm-class and 30nm-class memory.



Offer faster, longer multitasking with greater density, bandwidth and battery life.

Provide superior computing speed, faster response and higher resolution

Smart Memory delivers superb multitasking performance at impressive speeds while displaying higher resolutions than previous generations of memory. The improved density and bandwidth of Samsung Smart Memory, along with a thinner chip-stacking design, are enabling mobile devices to become even smarter.

The chip-stacking technology of Smart Memory enables it to do more in less space with double the memory bandwidth of the previous-generation memory. With Smart Memory solutions, a user can multitask more, install new apps faster than ever, and enjoy high-resolution 3D games and videos.

Boost power while enabling longer connections with energy-saving technology

As mobile devices increase in performance, they typically decrease in battery life. However, this is not the case with the latest generation of energy-efficient Samsung Smart Memory. Smart Memory extends both mobile phone and tablet battery life without sacrificing performance. The power savings occurs while the device is sleeping, when it is actually working to maintain connections, receive updates and more.

Consumers can benefit from the same rich user experience without draining their device's battery. With increased power savings at work while the device is sleeping, Smart Memory makes the most of consumers' always-on, always-connected lifestyle.

Allow more functions in less space with smaller, more powerful memory

With their super-slim form factors, Smart Memory solutions enable users to do virtually anything on a mobile device that they could do on a powerful PC. Users can perform similar functions on a thinner and lighter notebook PC, tablet or smartphone. The ultra-slim profile and chip-stacking technology of Smart Memory enables devices to do more in less space with double the memory bandwidth of the previous generation memory. Small, yet more powerful memory means screens can get bigger while devices can get thinner, lighter and smarter than ever before.

A smart day with Samsung Smart Memory

At 6:30 am, the wake-up alarm rings on the user's smartphone announcing the start of a new workday. Before leaving for the office, he quickly browses the web for the weather report and morning news. The high random write performance and wide bandwidth of the Smart Memory within the device enable seamless operation of all desired apps.

When he arrives at the office at 9:00 am, he picks up his ultra-slim notebook PC to bring to the conference room to give a Microsoft® PowerPoint® presentation. It starts up quickly, ready to go, driven by Samsung's powerful and reliable SSD. After the morning presentation, he takes his tablet rather than his notebook to an off-site lunch meeting to show his presentation to clients. Powered by Samsung LPDDR3 mobile DRAM, the tablet has many of the same capabilities, but is smaller and lighter to easily carry into the restaurant.

After his lunch meeting, he returns to his office to participate in a webcast with a co-worker in another conference room down the hall. Because the Samsung SSD in his notebook PC is so compact and lightweight, he can carry it around the office with ease.

At 6:00 pm, the user leaves his office, watching his favorite TV show on his smartphone on the train on his way home. The smartphone responds without any lag time and instantly he's viewing streamed video of the latest episode. The smooth video reception and high-definition imaging made possible by the Samsung eMMC chip inside his smartphone provide him with the superior viewing experience he enjoys.

Features and benefits

| | Benefits |
|--------|---|
| LPDDR3 | Low power consumption rates without sacrificing density, high operational speeds or performance. |
| eMMC | High storage capacity, expanded computing power and added content storage, with simplified system design and integration. |
| SSD | Fast read and write speeds, high multitasking capabilities, exceptional reliability and stability, as well as reduced energy consumption. |
| eMCP | Optimized PCB space, low power consumption, high memory density and easy scaling. |

Legal and additional information

About Samsung in Education

Samsung Electronics Co., Ltd. is a global leader in technology, opening new possibilities for people everywhere. Through relentless innovation and discovery, we are transforming the worlds of televisions, smartphones, personal computers, printers, cameras, home appliances, LTE systems, medical devices, semiconductors and LED solutions. We employ 236,000 people across 79 countries with annual sales of US\$187.8 billion. To discover more, please visit www.samsung.com.

For more information

For more information about Samsung Smart Memory, visit www.samsung.com/smartmemory



Copyright © 2013 Samsung Electronics Co. Ltd. All rights reserved. Samsung is a registered trademark of Samsung Electronics Co. Ltd. Specifications and designs are subject to change without notice. Non-metric weights and measurements are approximate. All data were deemed correct at time of creation. Samsung is not liable for errors or omissions. All brand, product, service names and logos are trademarks and/or registered trademarks of their respective owners and are hereby recognized and acknowledged.

Samsung Electronics Co., Ltd.
416, Maetan 3-dong,
Yeongtong-gu
Suwon-si, Gyeonggi-do 443-772,
Korea

www.samsung.com

2013-11