Samsung Mobile DRAM

High-speed, power-saving memory in a slim profile supports the next generation of mobile devices

QDP cross1 Package
Obtain higher performance with less power consumption.

Samsung Mobile DRAM delivers high-performance and extended battery life

With the industry shift from desktop PCs to mobile devices, consumers want powerful yet slimmer profiles in tablets, smartphones, MP3 players and other handheld products. Reduced power consumption and longer battery life are also key requirements that consumers demand in mobile devices.

This need for more powerful and thinner mobile tools is requiring device manufacturers to find versatile, high-performance memory solutions that use minimal memory board space. Faster and higher-density memory is needed to handle processing of sophisticated software and larger, high-resolution display screens.

Samsung Mobile Dynamic Random Access Memory (DRAM) helps optimize performance with higher operational speeds, enabling users to power through memory-intensive applications and multitasking functions.

Samsung has introduced the world’s first 30 nm class Low Power Double Data Rate (LPDDR) memory with LPDDR3 technology. LPDDR3 memory boasts higher bandwidths and outstanding energy efficiency. It is designed to deliver significant power savings compared with the previous generation LPDDR2 memory, while enhancing performance with Full High-Definition (FHD) viewing.

Higher bandwidth and data transfer rate

The Samsung Mobile Double Data Rate (DDR) interface delivers a core speed of 200 MHz, and LPDDR2 memory delivers 400 - 533 MHz of speed. The data rate of Samsung Mobile DRAM is 1,066 Mpbs and the maximum bandwidth is 8.5 GB per second.

Samsung introduces the world’s first 30 nm class LPDDR3.

Figure 1. Handheld mobile devices represent a growing market
Prolong battery life while decreasing energy requirements.

Mobile DRAM ranked higher in energy savings over other memory tested

Samsung labs compared the power consumption of DDR3 DRAM (1.5 V), DDR3L (1.35 V) and LPDDR2. It was determined LPDDR2 showed 70 percent better power savings over the others tested.

Advanced circuit architectures conserve energy while maintaining performance

Innovative circuit design features in Samsung LPDDR2 and LPDDR3 memory help mobile devices conserve energy without sacrificing performance through several design features.

Monolithic chip
This chip enables users to gain additional power savings while maintaining the same total density as a dual-die package. The monolithic chip improves overall power efficiency at the component level up to 70 percent.

Temperature-Compensated Self-Refresh (TCSR)
Reduced power consumption in standby mode is enabled by this advanced, on-chip technology. Samsung LPDDR2 and LPDDR3 memory can add up to three days of standby battery life for a smartphone, a 23 percent improvement of the LPDDR1. This equates to an increase in standby battery life from 12.5 days to 15.4 days.

Partial Array Self-Refresh (PASR)
This feature adjusts the size of the memory array to be refreshed.

Deep Power Down (DPD)
This feature powers down the array.

Drive Strength (DS)
The programmable DS reduces the driver strength based on system needs, conserving energy.

Figure 2. Energy efficiency; EDP DRAM versus Mobile DRAM (1GB, 800Mbps)
Optimize space and efficiency for today’s lighter, thinner devices.

Thin, compact design provides flexibility for super-slim mobile devices

The increasing demand for smaller, more lightweight mobile devices presents a challenge for device manufacturers. Manufacturers need to find thinner mobile memory chips to conform to the space constraints of slimmer-profile devices.

Samsung Mobile DRAM is designed for flexibility with a choice of thin, small form-factor packages that occupy very little board space. The Samsung small form-factors include:

- Fine-Pitch Ball Grid Arrays (FBGAs)
- Package-on-Package (POP)
- Multi-Chip Package (MCP)

Because these packages have very small form factors, they can be used in the most compact devices where board space is extremely limited. Sizes range from 8 mm x 9 mm (0.33 in. x 0.36 in.) to approximately 16 mm x 16 mm (0.64 in. x 0.64 in.).

The super-narrow profiles provide a highly efficient use of board space. In addition, they have a significantly lower mass. This reduced mass helps keep the weight of the mobile device as light as possible, providing easier portability for the end user.

Figure 4. The super-slim profile of the Samsung 30 nm class 2GB LPDDR2 DRAM occupies very little board space, ideal for today’s ultra-thin mobile devices.

Figure 5. A cross-sectional view of a typical mobile DRAM encapsulated in an FBGA package.
Generate enhanced power with less energy consumption.

Low power, double data rates equate to less power consumption

High performance and increased battery life are key factors that measure the effectiveness and efficiency of mobile electronic devices. Samsung Mobile DRAM is optimized to deliver high performance and extended battery life. With low power, double data rates, these mobile synchronous DRAM chips are designed to consume less power than standard synchronous DRAM chips. These low power rates translate into longer battery life.

Optimize viewing on larger, high-resolution display screens

As the display screens on mobile devices become higher resolution for better definition and larger for improved readability, increased demands are placed on device performance. Samsung Mobile DRAM features high operational speeds that keep pace with today’s fast mobile CPUs and large, high-resolution displays.

Perform multitasking functions with increased density

Equipped with Samsung Mobile DRAM, mobile devices enable users to perform complex application functions and multitask with greater ease at enhanced operating speeds.

Features and benefits

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<th>Features</th>
<th>Benefits</th>
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<td>High performance</td>
<td>Experience optimized viewing on large, high-resolution mobile display screens</td>
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<tr>
<td>Increased density</td>
<td>Perform complex application functions and multitask with greater ease and speed</td>
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<tr>
<td>Low power consumption</td>
<td>Provide extended battery life with enhanced energy-saving features in operating and standby modes</td>
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<tr>
<td>Small form factor</td>
<td>Deliver lighter, thinner mobile devices to the marketplace with a slimmer design that uses less board space</td>
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Gain key advantages with high performance, low power use and slim design

Samsung Mobile DRAM is highly powerful, efficient and well-suited for today’s high-performance, battery-sensitive mobile electronic devices. Mobile DRAM chips are designed specifically for use in handheld, battery-powered computing and communication devices, such as smartphones, tablets and PDAs. These compact DRAM chips provide key features needed to power today’s mobile devices while offering small form factors and low power-consumption rates.

Because of extreme space constraints in the latest mobile products, Samsung Mobile DRAM is ideal for use in superthin mobile devices. In addition, these memory chips have a significantly low mass, which helps reduce the weight of the end products.

Even though the Samsung Mobile DRAM chip is extremely small, it does not sacrifice performance. Samsung Mobile DRAM can process the most complex applications and multitasking functions while delivering lower energy requirements and significant power conservation. The result: Users can do more and consume less energy.

Samsung Mobile DRAM is the preferred choice for the new generation of high-performance mobile devices.

Specifications

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<tr>
<th>Category</th>
<th>LPDDR2</th>
<th>LPDDR3</th>
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<tbody>
<tr>
<td>Density</td>
<td>2GB</td>
<td>2GB</td>
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<tr>
<td>CLK frequency</td>
<td>533 MHz</td>
<td>800 MHz</td>
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<tr>
<td>VDD1 / VDD2 / VDDCA / VDDQ</td>
<td>1.8 V / 1.2 V / 1.2 V</td>
<td>1.8 V / 1.2 V / 1.2 V</td>
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<tr>
<td>Data scheme</td>
<td>DDR</td>
<td>DDR</td>
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<tr>
<td>ADDR/CTRL scheme</td>
<td>DDR</td>
<td>DDR</td>
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<tr>
<td>Organization</td>
<td>x16/x32</td>
<td>x16/x32</td>
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Legal and additional information

About Samsung Electronics Co., Ltd.

Samsung Electronics Co., Ltd. is a global leader in semiconductor, telecommunication, digital media and digital convergence technologies with 2011 consolidated sales of US$143.1 billion. Employing approximately 222,000 people in 205 offices across 71 countries, the company operates two separate organizations to coordinate its nine independent business units: Digital Media & Communications, comprising Visual Display, Mobile Communications, Telecommunication Systems, Digital Appliances, IT Solutions, and Digital Imaging; and Device Solutions, consisting of Memory, System LSI and LCD. Recognized for its industry-leading performance across a range of economic, environmental and social criteria, Samsung Electronics was named the world’s most sustainable technology company in the 2011 Dow Jones Sustainability Index. For more information, please visit www.samsung.com.

For more information

For more information about Samsung Mobile DRAM, visit www.samsung.com/semiconductor.

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