SYNOPSYS®
Silicon to Software™

Synopsys and SK Hynix

DesignWare UFS, UniPro and M-PHY IP Enable First-Pass Silicon Success for SK Hynix UFS Device

"We needed help to quickly deliver a high-performance and power-efficient UFS 2.0 solution for mobile devices. By using Synopsys' DesignWare UFS, UniPro and M-PHY IP, optimized for power and performance, we were able to integrate the IP in two weeks, speed our design schedule by six months and achieve volume production." — J. W. Park, Senior Engineer, SK Hynix

Business

SK Hynix, the world's top tier semiconductor supplier, offers Dynamic Random Access Memory (DRAM) chips, flash memory chips (NAND Flash) and CMOS Image Sensors (CIS) for a wide range of customers globally.

Challenges

▸ Use proven and quality IP to reduce integration risk and quickly achieve volume production
▸ Meet aggressive power & performance requirements of Universal Flash Storage (UFS) solution for mobile devices
▸ Acquire IP that is compatible with the JEDEC and MIPI standard specifications to easily achieve interoperability

Synopsys Solutions

▸ DesignWare® UFS Host Controller IP, UniPro Controller IP, M-PHY IP

Benefits

▸ Achieved first-pass silicon success and fast volume production
▸ Integrated IP in two weeks and accelerated design schedule by six months
▸ Met stringent power and performance requirements with Synopsys' Mobile Solutions IP
▸ Completed successful interoperability by using JEDEC- and MIPI-compliant IP

Overview

Semiconductors are essential to all mobile and consumer electronic products and its performance often determines the performance of the final product. Since pilot production of Korea's first 16 KB SRAM in 1984, SK Hynix has led the industry with smaller, faster and lower power semiconductors. As the leader in the memory semiconductor industry, the company continues to innovate and secure new technology.

Most recently SK Hynix announced its UFS 2.0 64 GB device based on its own 16-nanometer (nm) NAND flash and in-house firmware and controller for mobile devices such as high-end smartphones.

To meet stringent power and performance requirements, accelerate design schedule and time-to-volume production, SK Hynix turned to Synopsys, industry's leading IP provider with a successful track record.

High-Quality DesignWare IP Solutions

To enable their UFS device and quickly deliver a differentiated product to market, SK Hynix utilized Synopsys' silicon-proven DesignWare UFS Host Controller IP, UniPro Controller IP and M-PHY IP. The Synopsys de-facto standard IP solutions is compliant with the JEDEC UFS 2.0, MIPI UniPro 1.60 and MIPI M-PHY 3.1 standard-specifications including High Speed, Gear 3 mode with 2 data lanes. This enabled SK Hynix to deliver the highest performance UFS device compared to alternative solutions. SK Hynix's UFS device delivers read/write speeds of 780 MB/s and 160 MB/s respectively. "The high-quality Synopsys DesignWare IP proved to be the difference in our ability to deliver the fastest and lowest power UFS solution in the market," said Park.
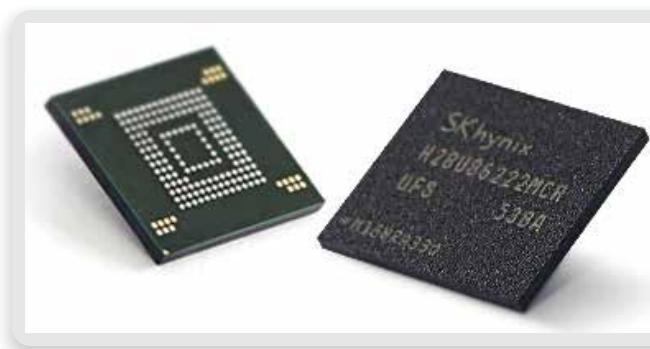
To achieve a more energy efficient solution, SK Hynix leveraged the ultra-low standby power and fast exit/entry latency features in the DesignWare IP. "The low-power features in the DesignWare M-PHY and UniPro IP enabled us to significantly lower power consumption by turning off un-used IP blocks," said Park. SK Hynix achieved interoperability with other widely-used mobile application processors by leveraging Synopsys' compliant IP. "Most importantly, the integration process was seamless," said Park.

Expert and Responsive Services and Support

"The Synopsys technical support team was there to help us every step of the way with timely responses and technical expertise," said Park. SK Hynix leveraged the Synopsys online support and communicated directly with the local team to quickly develop their UFS solution and achieve successful interoperability with many mobile application processors.

Building Future Products

"Synopsys met our design requirements, provided expert technical support and enabled us to deliver a best-in-class UFS solution that is used in popular high-end smartphones today. More importantly, we built a strong relationship with Synopsys, which we will leverage to discuss our future IP needs," said Park.