

S3 Graphics and Synopsys

Two Months of Verification Time Saved with DesignWare Verification IP

“We chose DesignWare® Verification IP for PCI Express® because it is easy to use, has high quality, and is backed by a leading IP provider with the infrastructure to support it.”

David Fong, Engineering Manager, S3 Graphics

Solution

- DesignWare Verification IP for PCI Express

Benefits

- Increased designer productivity
- Reliable verification results
- Faster verification
- Confidence in product quality

Overview

S3 Graphics is a leading provider in the intensively competitive graphics processor market. GammaChrome S18, S3 Graphics' latest graphics processor was designed to run on the new PCI Express bus, with up to 8GB/s concurrent bandwidth. Using DesignWare Verification IP, the development team reduced the risk inherent with the first time integration of a new bus standard and saved an estimated two months in verification time.

Staying ahead of the game with PCI Express

S3 Graphics GammaChrome S18 graphics processing unit (GPU) is designed for both PCs and laptops to increase the graphical performance of real-time 3D rendering for applications such as video games and home entertainment. GammaChrome S18 comes equipped with an advanced programmable video engine—Chromotion™ 2.0—that combines a wide range of video rendering, manipulation and display tools for a greatly enhanced digital media experience. The GammaChrome S18 chip is a 0.13-micron silicon-process design of approximately 80 million transistors. One of the key performance features of the GammaChrome S18 is its 16-lane PCI Express (PCIe) bus.

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Managing the risk of developing for PCI Express

Being one of the first with a PCIe product is a competitive advantage. At the same time, implementing a new protocol for the first time carries significant risk, especially one as complex as PCIe. The challenge for verification at S3 Graphics was to make certain the complex PCIe protocols were operating properly in the GammaChrome chip. The goal was to make the chip work the first time, in order to win the race to market, minimize development costs, and speed the time-to-profit.

Verifying functionality is especially tricky when dealing with a new specification. To verify all the functions of the GammaChrome design, S3 Graphics needed PCIe Verification IP to generate and respond to stimuli and check chip adherence to the rules of the protocol. Without the experience or the time to develop it themselves, the company looked for third-party verification intellectual property (VIP).

The evaluation of multiple VIP providers produced one clear winner—Synopsys DesignWare IP.

High quality Verification IP

The purposes for using VIP—to reduce development risk, time, and cost—can easily be defeated by poor quality. Excessive rounds of bug fixes and updates to VIP not only stall productivity and eat up the schedule; they also erode confidence in the product design, says David Fong, engineering manager for verification at S3 Graphics. “If the VIP is constantly changing, it is difficult to tell whether problems in the simulation are due to the chip design or the model. If we can reduce the number of factors that cause problems in our simulation, then we feel more confident.”

DesignWare Verification IP for PCI Express gave the GammaChrome verification team that confidence. With DesignWare VIP, they found that they had to update only once a month as new features were released, instead of often daily with competing products. “The quality and stability of the DesignWare VIP reduced the number of times we had to run our installation and verification process,” explains Fong.



S3 Graphics GammaChrome S18 Graphics Processing Unit

In addition, Synopsys provided a clear roadmap and schedule of updates. This enabled the GammaChrome team to plan its verification activities in parallel with the roadmap. They were able to run tests reliably with consistent results, and roadmap schedules for added capabilities were kept on target as promised.

The easier Verification IP to use

In addition to higher quality and reliability, the S3 Graphics verification team found that interfacing the DesignWare VIP to Verilog was simple. They could do it themselves, without requiring assistance from an on-site consultant. One of the advantages of DesignWare VIP for PCI Express is its flexibility; it integrates easily with any testbench—Verilog, VHDL, and Vera®. The verification team also gives DesignWare VIP high marks for easy-to-use and easy-to-read documentation that speeds learning and productivity.

One other factor that makes DesignWare VIP easy to use is good technical support. S3 Graphics reports receiving excellent customer support with fast answers to their questions. The quick turnaround that Synopsys provided was critical so the GammaChrome team didn't have engineers idling, waiting for an answer or solution.

Months sooner to market

The quality and the ease-of-use of DesignWare VIP for PCI Express saved S3 Graphics an estimated two months of verification time. In a market that sees frequent new product introductions that is a significant advantage. "Gaining a month or two that would have been lost by using poorer-quality VIP makes a big difference," concludes Fong. As a result, S3 Graphics is using DesignWare VIP for its next generation GPUs.

For more information about DesignWare products, visit www.synopsys.com/designware



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