

Synopsys and Siglead

Siglead Achieves First-Pass Silicon Success for SSD Controller IC with Synopsys DesignWare IP and ARC Processors

**SIGLEAD**

Synopsys' reputation as an established provider of silicon-proven IP was a key factor in our decision to use ARC processor IP in our SSD Controller LSI. The best-in-class ARC cores are easy to configure and we were confident that they would provide the flexibility and performance we needed to meet our design and schedule goals."

Yasuyuki Matsumoto

Director, Digital Solution Division, Siglead

Business

Siglead Inc., a fabless design house with a strong competency in signal processing technology, develops highly reliable, high-performance IC solutions for data storage devices.

Challenges

- ▶ Meet aggressive time-to-market window for solid state drive (SSD) controller chip
- ▶ Reduce integration risk with proven and reliable IP
- ▶ Achieve high performance and reduce integration effort
- ▶ Ensure compatibility with end-equipment already in the market

Synopsys Solution

- ▶ DesignWare® IP including:
 - ARC® 625 processor
 - SATA 6G PHY and Device Controller
 - DDR 2/3 PHY and SDRAM Memory Controller
 - DesignWare Library AMBA Bus Bridge (AXI to AXI, AXI to AHB and AHB to AXI)

Benefits

- ▶ Achieved first-pass silicon success and accelerated time to market by an estimated five months
- ▶ Achieved performance goals and reduced integration effort with silicon-proven DesignWare IP
- ▶ Received excellent technical support from an experienced support team that helped accelerate and ease the integration process

Overview

Siglead's error correcting code (ECC) technology addresses the increasing need for reliability in NAND flash memory solutions that experience a greater number of errors as a result of shrinking process geometries and the rapid adoption of multiple level cells. Based on its core competency in signal processing technology, Siglead is focused on developing highly reliable, high-speed SSD controller solutions for use in highly specialized consumer products including automotive infotainment systems, medical equipment, laptops and IT appliances. SSD is a rapidly growing and competitive market segment, making it critical that Siglead accelerate their product development cycle and time-to-market. To support this goal, Siglead required a reliable solution that would minimize integration effort and function reliably while delivering high performance. Synopsys' DesignWare IP portfolio offers an extensive range of silicon-proven processor, interface and infrastructure IP, making it possible for Siglead to select all their required IP from a single, trusted supplier.

High-Quality DesignWare Interface IP

Siglead knew that to meet their aggressive goal of achieving mass production quickly and gaining a large share of the highly competitive SSD controller IC market, they needed to focus their engineering effort on developing and implementing their unique ECC technology. For other critical blocks on their chip, they made the decision to use external IP. After evaluating several IP vendor options based on stringent criteria including quality metrics and a track record of successful silicon, Siglead selected Synopsys, including DesignWare Library, SATA, DDR and AMBA IP. More specifically, Siglead chose Synopsys' SATA 6G IP due to its cutting-edge technology implementation, and chose to add the DDR and AMBA IP for their proven interoperability with standard protocols, integrated tool suite and overall technical support. Additionally, Siglead reduced their end-to-end design time by using Synopsys' coreAssembler to simplify the assembly and configuration of the IP subsystem and easily generate configured RTL and interconnect logic.

Configurable DesignWare ARC Processors

Siglead selected Synopsys' ARC 625 processor for its excellent performance, reliability and high degree of flexibility. "The ARC 625 core has a proven track record, and has a flexible, highly configurable architecture that is not available in other solutions," said Yasuyuki Matsumoto, Director of the Digital Solution Division at Siglead.

The extensibility and configurability of the ARC core were key features that enabled Siglead to quickly implement their high-performance design and achieve first-pass silicon success. The design team at Siglead leveraged the extensibility of the ARC 625 processor, using ARC Processor Extension (APEX) technology to augment the core with its own custom instructions. "Ultimately, what we really benefited from was the configurability of the ARC processor, which let us tailor the core's features that we needed for our design," said Mr. Matsumoto. With the successful completion of their design using Synopsys' DesignWare ARC 625 processor, Siglead intends to continue to use ARC processors in future designs.

Expert and Responsive Support

Siglead integrated the DesignWare IP into their design within two weeks with no major issues, accelerating their time to market by an estimated five months. The accuracy and completeness of Synopsys' product documentation helped Siglead efficiently integrate the DesignWare IP into their SSD controller design. And when further assistance was needed, Synopsys' knowledgeable and responsive technical support was ready to provide timely and knowledgeable help, further easing the integration process.

"The quality of the DesignWare IP exceeded our expectations and the responsiveness and expertise of Synopsys' technical team was superb," said Mr. Matsumoto. "We will consider DesignWare IP for future projects with every confidence that Synopsys will continue to meet our design and support requirements."

"With a tight time-to-market window, we needed an IP supplier that would provide high-quality and reliable solutions. Synopsys' extensive DesignWare IP portfolio gave us access to the entire range of IP we needed, accelerating our development time by at least five months and enabling us to achieve first-pass silicon success."

Yasuyuki Matsumoto

Director, Digital Solution Division, Siglead