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Synopsys and Ambarella

Ambarella Delivers Innovative Hybrid Camera SoC Platform with High-Quality DesignWare USB and Ethernet IP

Synopsys' DesignWare USB and Ethernet IP products are clearly the best solutions in the market, providing the lowest power and smallest area compared to other offerings we evaluated."

Chan Lee
Vice President of Engineering, Ambarella

Business

Ambarella is the technology leader in low power, high-definition (HD) video compression and image processing semiconductors.

Challenges

- Delivering a complex hybrid, full HD camera system-on-chip (SoC) on schedule
- Meeting power, area and performance requirements
- Lowering integration risk with mature, silicon-proven IP solutions

DesignWare® IP Solutions

- USB 2.0 digital controller and PHY
- Ethernet 10/100 digital controller

Benefits

- Achieved first-pass silicon success with proven, high-quality IP
- Met the project schedule by enabling internal resources to focus on core competencies
- Received excellent technical support from experienced IP engineering teams

Overview

Ambarella products are helping to define a new class of hybrid digital cameras that bring consumers unmatched HD video and digital still images together in one integrated, low-power platform. The company's patent-pending SoC platform integrates the most critical system functions and offers customers a cost-effective solution while delivering the ultimate high-definition experience. A wide variety of cameras and camcorders have been shipped using Ambarella's SoC platform.

The fifth generation of this product line is the A5 SoC platform. The A5 platform combines a high-performance image pipeline with an H.264 compression engine. The platform enables key hybrid camera functions such as 10 mega-pixel still images, full HD recording and simultaneous dual-resolution recording for fast internet sharing. By incorporating high-speed video capture technology and noise reduction for still images and video, Ambarella provides the market with the ability to benefit from all the advanced features of a true hybrid camera.

The tunability capability [of the PHY] enabled us to make post silicon adjustments without having to do a complete metal re-spin which could have cost us up to $300,000."

Chan Lee
Vice President of Engineering, Ambarella

Leading DesignWare IP Solution

Ambarella developed the A5 platform, the industry's first single chip, full HD camera SoC platform that includes advanced features such as face detection to help with auto focusing and local exposure contrast. It also contains a dual recording capability to enable both HD and mobile video to be recorded at the same time. With the Ambarella A5 SoC platform, manufacturers are able to deliver a hybrid camera that combines the best of still photography, HD video recording and internet video sharing on a single device. This complex SoC, consisting of approximately 10 million gates had an aggressive project schedule and Ambarella needed to spend their engineering resources on these differentiated features of the product.

To help Ambarella focus on their core competency, they decided to acquire the necessary standards-based IP including a USB 2.0 digital controller and PHY IP and Ethernet 10/100 controller from a 3rd party IP provider. After evaluating several IP vendors, Ambarella determined that Synopsys' DesignWare IP was the ideal solution, offering the lowest power, smallest area and highest performance IP products.

Ambarella was particularly impressed with the built-in tuning circuits of the USB 2.0 nanoPHY. The tunability capability enabled Ambarella to make quick, post-silicon adjustments to account for unexpected board parasitics or process variations without having to modify the existing design. This allowed Ambarella to increase yield and minimize the cost of expensive silicon re-spins.

High-Quality IP and Excellent Support

With a critical time-to-market window, Ambarella needed IP solutions that would work the first time. Synopsys' proven track record of delivering high-quality, compliant IP gave Ambarella confidence that the USB and Ethernet IP would function precisely to the standard specifications and enable them to achieve first-pass silicon success. Ambarella also benefitted from the Synopsys coreConsultant tool, a part of the IP deliverable, which allowed them to quickly and easily configure the IP in real-time. According to Ambarella, this capability was not available from other IP providers.

For the few times that Ambarella needed support, Synopsys' knowledgeable technical team was there to address their issues in a timely manner. "Synopsys provided us with excellent support and was very responsive to all of our needs," said Mr. Lee. "The engineers were extremely knowledgeable and experts in their respective fields. The support we received from Synopsys was far better than our experience with many other IP vendors."

When asked what was the most valuable contribution that Synopsys brought to the project, Mr. Lee responded, "Synopsys gave us peace of mind that the USB and Ethernet IP would just work. By doing so, it gave us the ability to focus our efforts on the differentiated portions of our design." After achieving a successful tape out for the A5 SoC Platform, Ambarella is now focused on future product developments, which will definitely incorporate DesignWare IP.

"Synopsys' DesignWare USB and Ethernet IP is of very high-quality, easy to use and enabled us to achieve first-pass silicon success. We were able to configure and integrate the IP in about one week.

Chan Lee
Vice President of Engineering, Ambarella

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