

Synopsys and Realtek

Realtek Achieves First Silicon Success for Industry's First Certified USB 3.0 Card Reader with DesignWare USB 3.0 IP



Integrating Synopsys USB 3.0 IP into our design enabled us to tape out earlier than our competitors and be the industry's first to earn USB-IF certification for a USB 3.0 card reader."



Chi-Feng Wu

Director of Research and Design Center, Realtek

Business

Realtek Semiconductor Corp. is one of the world's leading IC providers. It designs and develops a wide range of IC products for communications network, computer peripheral, and multimedia applications.

Challenges

- ▶ Meet aggressive time-to-market schedule to upgrade USB card reader chip from USB 2.0 to USB 3.0
- ▶ Ensure device interoperability with host systems and end equipment already in the market
- ▶ Achieve USB-IF certification ahead of the competition

Synopsys Solution

- ▶ DesignWare® SuperSpeed USB 3.0 Device Controller

Benefits

- ▶ Achieved first-pass silicon success and met aggressive time-to-market schedule
- ▶ Reduced integration and interoperability risk with silicon-proven DesignWare USB IP
- ▶ Received excellent technical support that helped accelerate and ease the integration process

Overview

Realtek's SuperSpeed USB 3.0 card reader controller is the industry's first USB 3.0 card reader to be certified by the USB Implementers Forum, Inc. (USB-IF). The controller integrates built-in regulators and all card PowerMOS transistors that can dramatically reduce total system cost. With support for SD3.0 SDR 104 speed and CF card Ultra DMA7 mode, the controller can be used in a variety of USB 3.0 card reader applications.

USB is an evolving and competitive market, making it critical that developers innovate rapidly. Realtek has a USB 2.0 solution available now that has enjoyed success in the PC market. As the USB standard migrated from USB 2.0 to USB 3.0, Realtek required a USB 3.0 IP solution that could help them upgrade their product in a very short time-to-market window.

Since USB 3.0 is a new standard, the design verification and host compatibility hardware testing for the USB-IF are in flux: new tests are added, and test standards become stricter. Realtek needed a partner they could rely on to help them address these testing challenges and ensure USB-IF certification. Synopsys' DesignWare IP portfolio offers an extensive range of silicon-proven interface IP and infrastructure tools, giving Realtek the partner they needed for success.



Our design does not require a 32-bit RISC CPU, which presented additional challenges. Synopsys' technical support was excellent. The team was available and responsive from architecture to production."

Chi-Feng Wu

Director of Research and Design Center, Realtek

Complete, High-Quality DesignWare IP

Realtek knew that to meet their aggressive time-to-market schedule, they needed complete, high-quality IP from a provider with an excellent track record of success. After evaluating several IP vendors, Realtek chose Synopsys DesignWare USB 3.0 IP based on their previous success with the DesignWare USB 2.0 IP. Realtek's experience using DesignWare USB 2.0 IP resulted in easy SoC integration with their USB 2.0 PHYs and seamless system-level interoperability with USB 2.0 end products.

Realtek also selected Synopsys due to the completeness and flexibility of Synopsys' IP solution. Realtek offers a wide range of products that require a variety of USB IP: device, host, and multiple-port host. Only Synopsys' USB 3.0 IP solution offered reliable support for all of these different product needs, giving Realtek the flexibility they need to ship multiple products to market as quickly as possible. Furthermore, Synopsys offers flexible multi-port configurations, e.g., 4 USB 2.0 + 2 USB 3.0 ports, with the ability to share ports to the same bus interface, which saved Realtek chip area.

Realtek chose to take advantage of Synopsys' run-time software configurable registers. "Our engineers used run-time parameters in the Synopsys IP to fine tune interoperability with our PHY after we received silicon," said Chi-Feng Wu, Director of Research and Design Center at Realtek.

Responsive Technical Support

Synopsys helped Realtek achieve first-to-market, first-pass silicon success and USB-IF compliance certification with high-quality IP and responsive technical support. The accuracy and completeness of Synopsys' product documentation helped Realtek efficiently integrate DesignWare IP into their USB 3.0 card reader controller design. When further assistance was needed, Synopsys' knowledgeable and responsive technical support team was ready to provide timely and knowledgeable help, further easing the integration process.

"As our product integrates a simple MCU, we asked Synopsys for support," said Chi-Feng Wu. "We were impressed with Synopsys' responsive technical support, which further accelerated our time-to-market lead."

With this success of their USB 3.0 card reader controller well underway, Realtek is looking forward to incorporating Synopsys solutions in the next generation of their products.

"We offer a wide range of products in a highly competitive market, so we needed an IP supplier with reliable device, host, and multiple-port host USB 3.0 IP. Only Synopsys provided them all in a complete and flexible IP solution."



Chi-Feng Wu

Director of Research and Design Center, Realtek

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