

# Realtek and Cadence

“When we looked at our options to increase the capacity and speed of verification, we chose Virtuoso UltraSim Full-Chip Simulator.”

Shu-Yi Kao, Manager, Design Technology Department, R&D Center, Realtek

## The Customer

Realtek is a leading design house for embedded systems, specializing in mixed-signal processors, memory, and ultra-wideband devices. The company has 20 years of experience in this market.

## The Challenge

The Taiwan chip design market is extremely competitive. In an environment where designers can outsource fabrication to local foundries that serve clients from around the world, the company that can reduce time to market for its customers is well-positioned for success.

When increasing design complexity and size dictated a move to the next generation of simulation and verification in the mixed-signal arena, Realtek needed to shorten its design cycles with faster, more thorough simulation of large, complex mixed-signal designs.

## The Solution

To meet these marketplace challenges, Realtek chose Cadence® Virtuoso® Multi-Mode Simulation. Realtek engineers had already been using Virtuoso UltraSim Full-Chip Simulator and Verilog language for development.

“We were able to use our original databases for each step, from design to verification, which made it very easy to adapt to the new flow,” explains Shu-Yi Kao, Manager at Realtek. “The transition has been very smooth.”

## Business Challenge

- Reduce time to market

## Design Challenges

- Shorten design cycles
- Simulation of larger, more complex mixed-signal designs

## Cadence Solutions

- Virtuoso Multi-Mode Simulation
  - Virtuoso AMS Designer Simulator with UltraSim Analog Solver
  - Virtuoso UltraSim Full-Chip Simulator
  - Virtuoso Spectre Circuit Simulator

## Results

- Large-capacity design and verification based on known database structures
- Mixed-signal verification using FastSPICE technology

In addition, Virtuoso AMS Designer with UltraSim Analog Solver and Virtuoso Spectre® Circuit Simulator provide more comprehensive language support for designers accustomed to working in different environments. Cadence also provided a lot of engineering support during implementation and demonstrated new design flow methodologies and verification techniques. As a result, Realtek increased efficiency and productivity very quickly.

*“We valued the flexibility and savings that Virtuoso Multi-Mode Simulation gave us. We were able to change our tools and use them only as needed—without added expense.”*

In one of the first projects, which included 78K elements with two phase-locked loops (PLLs) in a nanometer-scale mixed-signal design, the full simulation took only 48 hours to complete. The full-chip simulation was easier to configure because it was based on the same parameters and definitions set up early in the design process and carried throughout each stage of development.

The fact that the entire process was conceptually integrated, with the initial design decisions more clearly linked to the end result, made the verification flow much easier. This helped Realtek not only to shorten project time, but to achieve first-time silicon success as well.

Realtek decided to maximize its access to the full range of Cadence design and verification technologies while minimizing the up-front investment by electing to use the Virtuoso Multi-Mode Simulation token system. These tokens allow designers to activate only the software needed at each step of the development process—focusing the software’s full potential at each step without the overhead of owning licenses for software Realtek was not using at that stage.

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### Summary and Future Plans

Since integrating Virtuoso technologies, Realtek has used Virtuoso Multi-Mode Simulation on several different projects with dramatic results. The ability to deliver first-time silicon success on projects has also improved both customer satisfaction and the company’s profitability.

In addition to improving existing design processes along the increasing function/reduced format curve, Realtek continues to achieve success in aggressive new areas of low-power design.

Cadence technology is a great fit for Realtek, helping to improve existing processes and providing expandable capabilities through flexible licensing. This allows the company to focus on its core strengths.



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