

CR-8000™

Multi File Player



ONTEC uses CR-8000 to develop a next-generation product in less time despite rigorous design constraints



"Ontec supports customers' product creation with the analysis results and methodologies developed utilizing integrated Zuken and Keysight environments."

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ONTEC faced a difficult challenge: develop a multimedia broadcasting product while complying with a customer's electromagnetic interference requirements, all within a tight development schedule. ONTEC used Zuken's CR-8000 with Keysight's ADS (including SiPro) to meet the requirements of the challenge.

The Wish List

One of ONTEC's new development efforts focused on designing a multimedia video broadcasting product called Multi File Player KAMELEON (MFP-330). The KAMELEON accepts a wide variety of media inputs (HDMI, SD Cards, and USB) for broadcasting. ONTEC's customer had stringent electromagnetics requirements for low noise and interference and required delivery on a tight schedule. ONTEC took on the challenge to develop this high density, complex design that included a countermeasure circuit in a shorter than average timeframe.

To fulfill the customer's requirements, ONTEC decided to follow a 'right the first time' design process. The concept

was to use simulation progressively and continuously throughout development to minimize backtracking and re-spins. The design process involved:

- Conducting fast and simple power integrity simulations during schematic and layout phases of board design.
- Running detailed, time-intensive power integrity analyses to verify power integrity against earlier fast and simple simulations.
- Manufacturing and testing board prototypes to correlate physical results against power integrity analyses.

Results

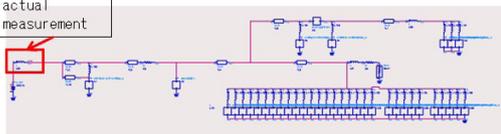
- Reduced analysis time by 86%
- Progressive, accurate prediction of power integrity throughout development
- Adherence to electromagnetic interference and compliance constraints
- Complex design delivery on a tight schedule



ONTEC has manufactured a wide variety of electronic devices and components for over 40 years. The most distinctive feature of ONTEC is that it handles planning, manufacturing, and sales completely in-house. The company's employees are passionate about meeting customer's expectations. The employees have accumulated a wealth of knowledge over time, which they share to the benefit of customers. ONTEC's mission is to create the best products and services that satisfy changing times and needs.



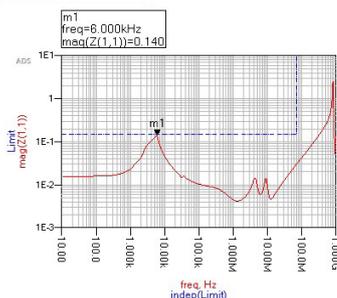
Set from actual measurement



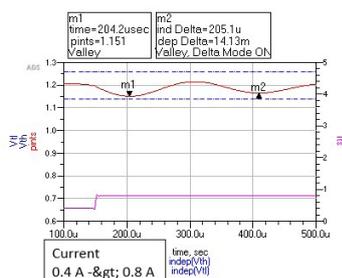
Capacitor type and counts are decided during the placement

CR-8000™

CR-8000 is a product-centric design solution that provides tools to optimize a design at both the product and the PCB design levels. Product-centric detailed design includes RF design and verification, embedded signal integrity, power integrity, FPGA I/O optimization, chip/package/board co-design and 3D MCAD integration all in one design process.



0.1 uF x 20
0.47 uF x 5
10 uF x 5
330 uF x 1



ONTEC discovered that Zuken and Keysight Technologies alone provided an integrated solution to meet their design needs. ONTEC engineers developed board schematics and layouts in Zuken's CR-8000 and analyzed them in Keysight Technologies' ADS. Tight integration between products allowed engineers to pass designs back and forth. As a result, engineers were able to execute fast design and simulation iterations, driving design decisions on performance.

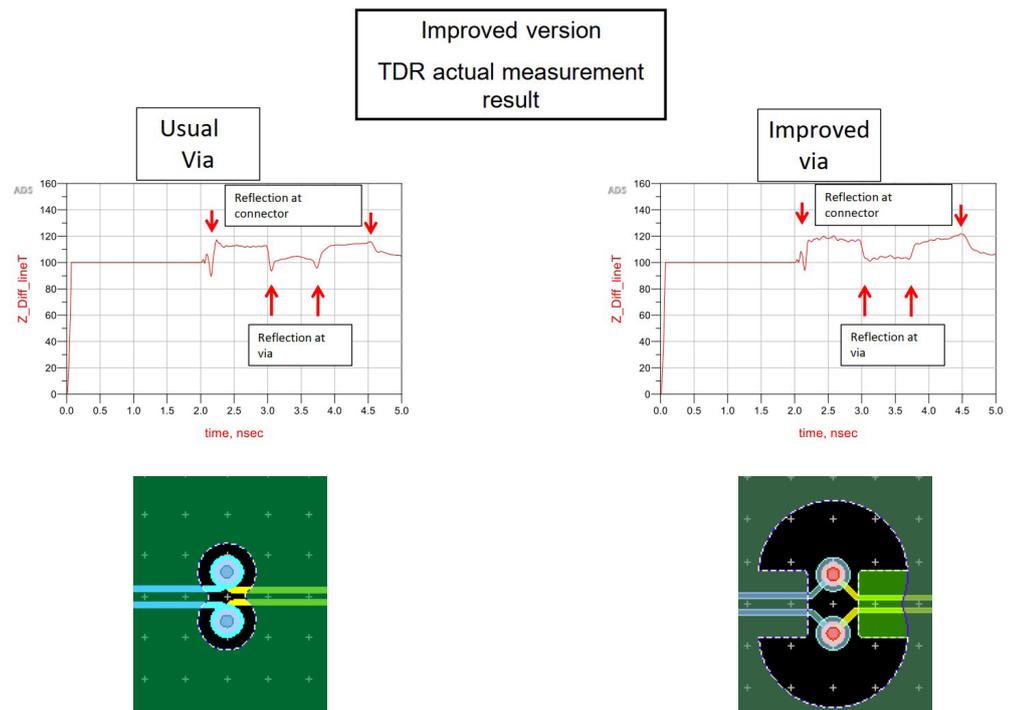
The Design Process

ONTEC's assessment of power integrity and signal integrity didn't start once design was complete. Instead, it spun up in the middle of detailed design. Engineers passed pre-layout designs from CR-8000 to Keysight's ADS for fast, easy, low-fidelity simulations and used results to drive design decisions. Moreover, many Zuken licenses allowed many engineers to design and analyze performance simultaneously, even alternating between day and night. This flexibility supported a rapid pace of design, allowing engineers to check performance within a day. The higher signal speed caused complicated interactions between impedance and attenuation. By iterating on via distance and size, they found

the right balance to maintain power and signal integrity.

Next, ONTEC's engineers proceeded to the post-layout phase for the circuit boards. As engineers placed components and routed the traces, they shifted those designs to Keysight's ADS.

The shift to Keysight's ADS powered detailed, time-intensive analyses. The engineers analyzed the entire power plane, getting in-depth insight into signal and power integrity performance. The engineers also compared these detailed results with those they gained when analyzing power integrity with the pre-layout analysis. Matching results reassured engineers that they were experiencing consistent behavior as the design matured throughout the design process. As an example, they saw that as the signal rise time approached 60 psec, the influence of vias clearly emerged. The engineers eventually resolved this SI issue with a unique via/clearance structure after various trials on Zuken/Keysight. The smooth integration was helpful for what-if analysis with various combinations of via/clearance structure without any stress.



Difference between usual via and improved via

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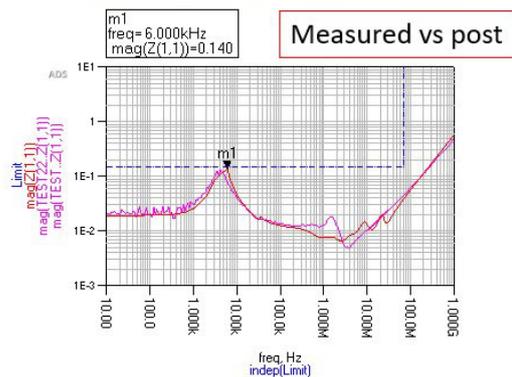
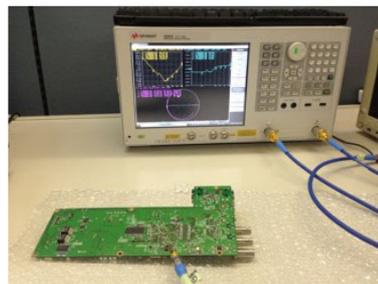
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The last and most critical step in this new process involved actual measurement verification/validation of the prototype boards. ONTEC engineers used a Keysight Network Analyzer to measure power and signal integrity during tests with modeling critical elements such as VRM and electrolytic capacitors. Pass and fail tests were critical.

The engineers also compared physically measured performance against the detailed simulations conducted in Keysight’s tool. Results were remarkably similar. Again, ONTEC’s engineers were reassured about the power integrity of the KAMELEON’s boards.

ONTEC’s design process can be simply summarized as follows: start with the simulation and come up with the design standards. During the PCB layout design, the engineers repeatedly analyze the various aspects in signal and power integrity with Zuken and Keysight tools.

Finally, they measure the performance with the actual prototype boards and compare the simulation with the actual measurement results. Engineers identify performance gaps and improve the design methodology, which result in an overall reduction in the number of the prototype boards that are physically built. The image below depicts the overlay of the simulation result and the actual measurement with the board, demonstrating the accuracy of simulation results.



Physical Test Verification of Power Integrity



GAIN-PHASE port



Spara port