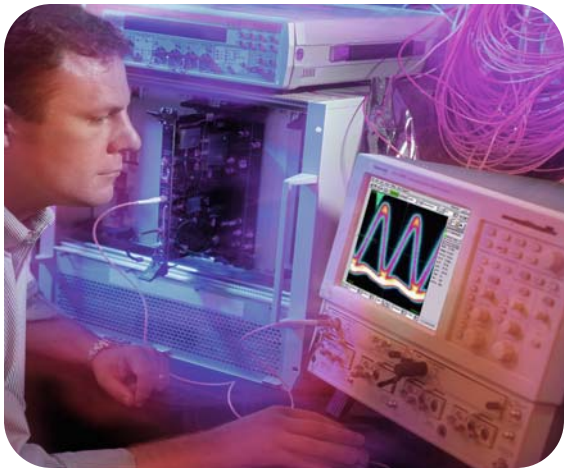
Altera Finds Performance Validation of High-Speed, Configurable FPGA Requires Flexible, Powerful Test Instrument



Solution Summary	
Challenge	Validate performance of the world's only errata-free 90nm FPGA that operates at speeds exceeding 3 Gb/s and verify conformance to many serial standards.
Solution	Tektronix CSA8200 Series Communications Signal Analyzers, 80E04, and IConnect® S-Parameter Software.
Benefits	The CSA8200 has delivered the performance necessary to accurately measure device jitter and signal integrity of the 90nm Stratix II GX FPGA, and has the flexibility necessary to verify standards compliance and perform S-parameter analysis. In addition, it has enabled Altera to showcase the speed and signal integrity of Stratix II GX FPGAs to its customers.

Industry standards have done wonders for increasing the performance and reliability of electronic components. However, they can also splinter or delay system development efforts since components must be designed with standards compliance at their core. Fortunately, electronic components are becoming more sophisticated and are designed to support multiple standards simultaneously.

As a result of changing standards, markets, and system requirements, traditional Application-Specific Integrated Circuits (ASICs) are being displaced from consideration by Field-Programmable Gate Arrays (FPGAs), which are more cost-effective and flexible. Design teams can program FPGAs to meet the specific requirements of their system as well as the compliance mandates of industry standards.

Newer classes of advanced FPGAs, with variable standards compatibility and rich feature sets, have greatly increased the validation demands on the manufacturers that produce them. Altera Corporation is a leading manufacturer of ultra-high performance configurable FPGAs, as well as low cost FPGAs and structured ASICs.

"Our high-performance Stratix II GX FPGA must operate with the lowest power dissipation, and maintain exceptional and consistent performance over various media, while having enough spec margin to enable our customers to attain system-level compliance to various industry standards," said Andy Turudic, Senior Manager at Altera. "These levels of performance and flexibility create a significant measurement and validation hurdle. There are numerous 'moving targets' we have to hit."

Ironically, developing the Stratix II GX family, the world's first 90nm FPGAs to deliver speeds exceeding 3 Gb/s, was only half the challenge. Altera also had to prove the FPGAs' industry leading performance and signal integrity to customers.

"We needed a way to measure device jitter to prove signal integrity, verify eye openings for standards compliance and show S-parameter analysis results," Turudic said. "The Tektronix CSA8200 fit the bill perfectly."

Tektronix CSA8200 Delivers Performance and Flexibility

Based on multiple measurement and validation needs, Altera turned to the Tektronix CSA8200 Series. An equivalent-time oscilloscope, the CSA8200 Series offers ideal performance and

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functionality for characterizing high-speed devices and systems.

"The CSA8200 provides the most flexible time and frequency domain bench platform as compared to other communications test instruments on the market," said Turudic. "This enables us to capture and demonstrate the most accurate representation of the quality of our FPGA output. This also allows us to characterize various transmission media which optimizes the signal integrity enhancement settings that our devices feature for a given application."

The performance specifications of the CSA8200, which can deliver more than 70 GHz bandwidth through plug-in modules, enable Altera to show its customers the advanced capabilities of the multi-gigabit FPGA and verify the effectiveness of the chip's signal integrity features.

In addition to sheer power and speed, the CSA8200 offers a wide array of capabilities for evaluating the multi-format FPGA. Since Stratix II GX FPGAs operate at various, application-specific, speeds (from 622 Mb/s to 6.375 Gb/s) and over differing media (such as a high-speed backplanes, cables, and fiber optics), the flexibility of the CSA8200 is important, Turudic noted. The CSA8200 generates meaningful and easy to understand measurement results, not just raw data, with time and amplitude histograms, mask testing and statistical information. In addition, the CSA8200 provides a communications-tailored measurement set that includes jitter, noise, duty cycle, overshoot, undershoot, OMA, extinction ratio, Q-factor, mean optical power and amplitude measurements for both RZ and NRZ signals.

According to Turudic, these features have proven invaluable in showcasing Stratix II GX FPGAs in multiple modes of operation across a range of applications environments. "The CSA8200 gives us three essential software test applications in one hardware package," he explains. "Traditionally, jitter testing, eye opening measurements and S-parameter analysis would have required three distinct instruments."

Verifying conformance to multiple standards is fundamental to Stratix II GX device validation, and an area where the CSA8200 excels. Stratix II GX FPGAs have transceiver support for PCI Express, SDI, SONET and XAUI, among others. These same protocols can be validated by the compliance mask testing capabilities included in the CSA8200.

"Setting up mask trigger events using the CSA8200 is seamless for our teams as well as for our customers," said Turudic. "As a result, they are able to quickly and repeatably verify FPGA compliance with a number of different standards."

Altera Stands Behind the CSA8200

Because of its ability to validate and showcase the operation and standards compliance of Stratix II GX transceivers, the CSA8200 has helped Altera boost the adoption curve of its latest FPGA worldwide. Today, the Stratix II GX family, along with its IP solutions, EDA, and T&M ecosystem, is uniquely positioned to displace costly, high-risk solutions such as traditional ASICs. Stratix II GX FPGAs enable new and innovative systems architectures and capabilities with its System on a Chip (SoC) integration levels.

"There has been skepticism about the performance of FPGAs because our competitors have made promises that they have failed to deliver," Turudic said. "With the CSA8200, we can easily prove that we can deliver an errata-free FPGA that not only operates at speeds in excess of 3 Gb/s, but that it does so with exceptional signal integrity."

Without any doubt about its low power and high-performance, Altera's customers have been broadly incorporating Stratix II GX FPGAs into their systems. Turudic adds that the CSA8200 has become the instrument of choice for many companies implementing the Stratix II GX family in their designs.

"We recommend the CSA8200 to companies working with our FPGAs," he concluded. "It delivers speed, repeatability, flexibility and unmatched signal integrity in a single package. For measuring and validating communications components and systems, it's the best bang for the lab buck."