

## On The Bleeding Edge: Tektronix Logic Analyzers Enable Tundra Semiconductor to Develop First RapidIO® Switches and Get To Market Faster



### Solution Summary

**Challenge** Design, verify and debug the industry's first silicon switches supporting parallel and serial RapidIO®

**Solution** Tektronix TLA7000 Series logic analyzer with TMS805 RapidIO application support package that enables 800 MHz state acquisition with 1.25 Gb/s data rate, 125 ps timing resolution on all channels, real-time triggering of RapidIO symbols, packets and transactions and full view of logic, transport and physical layers

**Benefits** The TLA Series logic analyzers enabled Tundra to save significant time and effort in the verification and debug phases of switch development to get to market faster.

It is a common scenario for design leaders working on next generation technologies.

A company seeks to develop a product using a brand new and unproven technology. However, tools capable of testing that specific technology are not yet available because no products employ it.

This was the dilemma facing Tundra Semiconductor Corporation as it set out to produce the industry's first silicon switches supporting parallel and serial RapidIO® technology.

A new data communications standard for connecting chips on a circuit board and linking circuit boards across a backplane, RapidIO is a high-performance, packet switched, system interconnect architecture, primarily targeted at the networking and telecommunications industries. RapidIO architecture delivers significantly increased transmission speeds to enable the design of next-generation infrastructure and communications equipment, but with it comes compliance and interoperability issues.

"Being on the bleeding edge of RapidIO development and not having any test solutions able to analyze it was like to being up a creek without a paddle," said Geoff Roddick, Senior Applications Engineer at Tundra.

### Enter Tektronix – the Market Leader In Logic Analysis

With the world's most powerful logic analyzers, and an affinity for emerging technologies, Tektronix quickly embraced the challenge of developing a robust test solution for RapidIO.

The result? The Tektronix TMS805 RapidIO application support package. When coupled with a Tektronix TLA7000 Series logic analyzer, TMS805 delivers superior probing, triggering, display and analysis capabilities for RapidIO, enabling engineers to quickly and easily implement the architecture into their designs.

“Tektronix was on a similar path with regard to RapidIO, and they worked closely with us to enable the development of our Tsi500™ RapidIO Multi-port Switch and Tsi568A™ Serial RapidIO Switch,” said Roddick.

Tektronix’ comprehensive tool set enabled Tundra engineers to resolve issues quickly and efficiently as they implemented RapidIO into their designs. Tundra relied heavily on the TLA7000 Series logic analyzers with TMS805 RapidIO support package

**“Our TLA7000 gives us an impeccable view of all system activity.”**

-Geoff Roddick, Senior Applications Engineer,  
Tundra Semiconductor

to verify its silicon, detect and troubleshoot hardware errors as well as identify and resolve software bugs.

“The switches worked remarkably well, but we had some problems with the software,” noted Roddick. “We weren’t expecting those, and the Tektronix logic analyzers caught them immediately.”

TLA7000 Series logic analyzers provide up to 800 MHz state acquisition with 1.25 Gb/s data rate for advanced processors and buses, in addition to 125 ps timing resolution on all channels.

The TMS805 application support package facilitates the testing of 8 and 16-bit RapidIO rates up to 1 Gb/s and provides real-time triggering on symbols, packets and transactions. It comes with predefined templates for common trigger events and also supports custom trigger configurations for advanced applications. For Serial RapidIO, Tektronix also leverages Nexus Technology, Inc., one of their Embedded System Tools Partners, to provide support for up to 3.125 Gbps links using the NEX-SRIO package.

### **Tektronix Logic Analyzers Offer Comprehensive View of System Activity**

The Tundra Tsi500 is a high performance Parallel RapidIO multi-port bus switch with four RapidIO interfaces that deliver 8-bit data width. Offering exceptional performance monitoring capabilities, the Tsi500 gathers and displays statistics of data traffic on each interface.

The Tundra Tsi568A is the industry-leading serial RapidIO switch supporting an 80 Gb/s aggregate bandwidth. It incorporates SerDes functionality, error recovery, priority-based fabric routing, high payload efficiency and table-based fabric packet routing.

According to Roddick, developing and testing these high performance System Interconnect switches was a complex undertaking aided by the flexibility and power of Tektronix logic analyzers.

“Our TLA7000s give us an impeccable view of all system activity,” he exclaimed. “We are able to trace transactions and data throughout a system, from a PCI bus to RapidIO switch and back out to another PCI bus. In fact, it is not uncommon for us to be monitoring two PCI buses and four RapidIO interfaces at the same time with a single Tektronix logic analyzer.”

The ability to capture the RapidIO serial stream, view the full logic, transport and physical layers and correlate the digital world with the analog world was essential.

“The flexibility of the Tektronix instruments is likely their biggest benefit, from their modularity to their diverse display and analysis capabilities,” said Roddick. “With the capacity to analyze digital packets sent and the corresponding analog output, examine both the serial streams transmitted and received, and monitor all three layers, we were able to quickly determine where data corruption took place or when packets were sent to the wrong location.”

Roddick indicated the instruments saved Tundra significant time and effort in the verification and debug phases of switch development.

“Without Tektronix logic analyzers, it would have taken us five times as long to verify our hardware, and we simply would not have been able to debug the software,” he stated. “We could not have developed these products without them.”