

SPW-10X ROUTER ASIC TESTING AND PERFORMANCE

Session: SpaceWire Components

Short Paper

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ABSTRACT

The SpW-10X SpaceWire routing switch ASIC is a radiation tolerant device designed to support European and international space missions. It has eight SpaceWire ports and two parallel ports, supports both path and logical addressing, includes various failure detection and power saving features, operates at up to 200 Mbits/s and switches packets in less than 0.5 μ s. LVDS drivers and receivers are included on-chip to save board area, mass and power.

The SpW-10X IP was designed by University of Dundee. Austrian Aerospace prepared this design for implementation in an Atmel radiation tolerant ASIC. EADS Astrium GmbH validated the design and Atmel implemented the ASIC. Funding and overall management was provided by ESA.

The SpW-10X device has been tested in several different ways:

- During design by University of Dundee a VHDL tests bench was used for initial testing.
- An independent test bench was developed by Austrian Aerospace providing extensive tests and identifying several issues with the initial VHDL code.
- The Router IP was implemented in several STAR-Dundee devices and has been widely used by many organisations.
- The SpW-10X device was implemented in a Xilinx FPGA with the design kept as close as possible to the final VHDL code used for the ASIC design. This SpW-10X FPGA was extensively tested by EADS Astrium GmbH.
- A second SpW-10X FPGA device was implemented as a mezzanine board in preparation for final ASIC prototype testing.

- A similar board was designed to carry the SpW-10X ASIC. As soon as the SpW-10X device was available it was mounted on this test board.

The prototype ASIC devices were delivered in November 2007 and an extensive test campaign was then performed to fully characterise the devices:

- Functional validation by EADS Astrium,
- Performance testing by University of Dundee,
- Characterisation by Austrian Aerospace.

The SpW-10X device is now being sold by Atmel as the AT7910E and is being designed into space missions. This paper introduces the SpW-10X device, describes how it was tested and presents the test results.