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Find the *Vecima / Spectrum Signal Processing PRO-3100-009* at our website: *Click HERE*

SPECTRUM SIGNAL PROCESSING

PRO-3100

Virtex-II FPGA Processing Engine

cPCI

flexComm

Benefits

- High-performance reconfigurable computing engine
- Facilitates intermediate frequency (IF) processing using the highest performance FPGAs available in the industry
- Allows very high channel densities to be realized (approx. 100 narrowband down converter channels per PRO-3100)
- FPGA wrapper abstracts board-level logic to speed FPGA firmware development and maximize code portability
- Embedded controller offloads system control from the FPGA processors
- High-performance dataflow paths to match processing performance
- Facilitates construction of fault tolerant, high availability systems

Applications

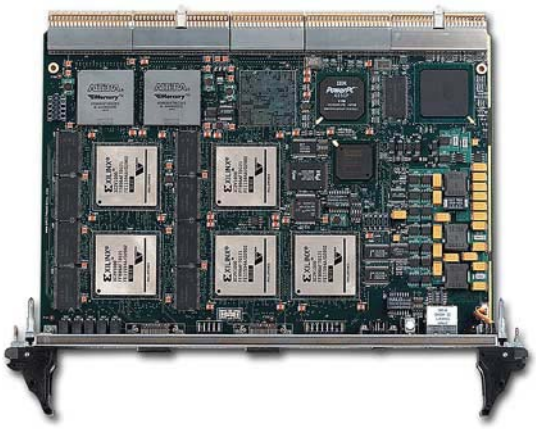
- Military communications (e.g. JTRS, ACN), Wireless intelligence and surveillance, Commercial wireless (e.g. Satellite gateways, 3G cellular base station prototyping),Wireless test and measurement, Wireless prototyping, Direction finding/Beam forming

Features

- 6U CompactPCI® board
- Designed to interface to the TM1-3300 and PRO-3500 (PowerPC™ G4) boards
- Four user-programmable Xilinx® Virtex-II FPGAs, each supporting up to 6 million gates
- IBM 405GP PowerPC embedded controller
- Six 320 MB/s *flex*Fabric Serial RapidIO™ links for board-to-board communications
- Supports two 640 MB/s busses via cPCI J5 connector (TM1 bus)
- 640 MB/s links connect each Virtex-II FPGA with the TM1 bus interface
- 400 MB/s links connect the Virtex-II FPGAs to each other and to the *flex*Fabric interface
- 128 MB SDRAM per Virtex-II FPGA node
- 10/100-BaseT Ethernet via either PICMG 2.16 packet switched backplane or front panel
- RS-232 backplane and front panel port
- 16 user-defined pins from each Virtex-II FPGA brought to front panel
- Supported by VxWorks®, TAO CORBA and Spectrum's *quic*Comm software library

Description

The PRO-3100 is a CompactPCI-based FPGA processing engine designed to work with Spectrum's SDR-3000 series subsystems. It contains four user-programmable high-performance Xilinx Virtex-II FPGAs for processing of very high data rate signals, a typical requirement in the IF processing portion of a digital transceiver. A series of high-performance busses provide the exceptionally high data throughput to match the processing capabilities of the FPGAs. Finally, an embedded controller is also provided to run control software and provide seamless networking.



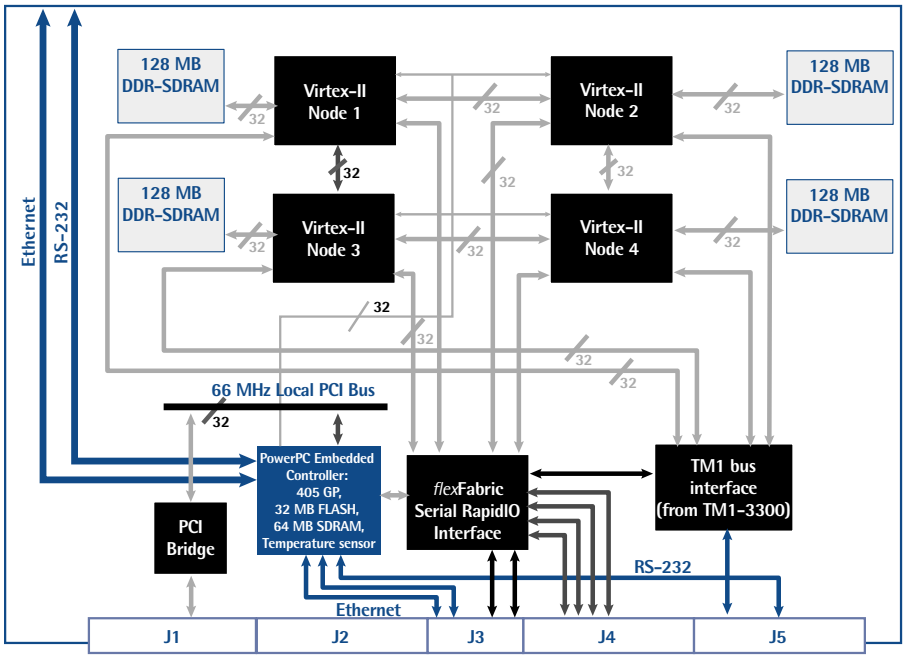


Figure 1. PRO-3100 architecture

Dataflow

In order to assist you in mapping your application dataflow to the PRO-3100, the following table of data throughputs are provided:

Data path	Throughput
TM1 bus to Virtex-II FPGAs	Each of the four links supports 640 MB/s (raw data), half-duplex, while the TM1 interface itself supports 640 MB/s, full-duplex. When used with the TM1-3300, the data from all four A/Ds on the TM1-3300 can be passed to each Virtex-II, which is ideal for applications that include beam forming
Virtex-II to Virtex-II links	Each link supports 400 MB/s (raw data), half-duplex
Virtex-II FPGAs to *flex*Fabric interface	Each link supports 320 MB/s (payload data), half-duplex
*flex*Fabric interface to *flex*Fabric backplane	Each of the 6 links support 320 MB/s (payload data), full-duplex, where the total amount of data that may be moved over this interface may not exceed 640 MB/s (payload data), full-duplex, at any given time
Virtex-II FPGAs to embedded controller	At any given time, 10 MB/s transfers (raw data) are possible between any one FPGA and the embedded controller
Virtex-II FPGAs to SDRAM	Aggregate read/write speed (continuous) is 780 MB/s Aggregate read/write speed (interleaved) is 484.6 MB/s
Embedded controller to Ethernet	The 10/100-BaseT Ethernet connection supports 12.5 MB/s (raw data), for an estimated payload data rate of 5 MB/s (Ethernet packets have significant overhead)

Note that in certain applications, it may be possible to implement all signal processing on the PRO-3100, in which case the lower speed payload data can be moved on/off the PRO-3100 via the Ethernet or cPCI interface.

Virtex-II FPGAs

[FPGA Cores]

Any Virtex-II compatible core, such as those available on Xilinx's partner web, can be used on the PRO-3100.

In addition, Spectrum routinely creates custom cores as required by customers. Please contact your Spectrum representative if this is required.

[FPGA Wrappers]

The user-programmable Virtex-II FPGAs are supplied with a level of programming which abstracts the user from board-level glue logic. This is called the FPGA wrapper. The specific functionality contained in the wrapper, and therefore abstracted from the user, includes:

- Control of the TM1 bus
- Control of the SDRAM (i.e. it appears as a simple memory mapped interface)
- Control of the inter-FPGA bus links
- Control for the *flex*Fabric connection
- Control of the embedded controller connection

Verilog source is supplied with the wrapper, allowing the firmware programmer to make customizations if required.

[FPGA User-defined Pins]

Sixteen user-defined pins from each Virtex-II are brought to the front panel of the PRO-3100. These can be used for any user-defined function.

[FPGA Debug]

Debugging of the Virtex-II FPGAs is supported via a JTAG port on the front panel.

[FPGA SDRAM]

Each of the four user-programmable Virtex-II FPGAs has 128 MB[1] DDR-SDRAM, with SDRAM control abstracted via the wrapper interface.

The data bandwidth between FPGAs and SDRAM is 400 MB/s.

405GP Embedded Controller

The PRO-3100 contains a user-programmable embedded PowerPC 405GP controller to offload system control from the FPGA processors, which can then be dedicated to signal processing. It also provides a seamless network interface.

Interfaces

[*flex*Fabric]

The PRO-3100 has six *flex*Fabric (Serial RapidIO) links. This means that up to six 320 MB/s full-duplex packet switched data paths are supported between the PRO-3100 and other PRO-3100 or PRO-3500 boards in the system.

In fault tolerant applications, this feature can be used to provide redundancy by allowing the PRO-3100 to communicate with multiple PRO-3500s, where one or more are redundant.

[Ethernet]

The 10/100-BaseT Ethernet port of the 405GP embedded controller is brought out to both the front panel as well as the PICMG 2.16 compliant connection on the cPCI backplane[2].

Software

Please see the SDR-3000 series data sheet for a full software description.

1 Future versions will support 256 MB of DDR-SDRAM per Virtex-II. Please contact your Spectrum Sales Representative for more details.

2 PICMG 2.16 will be supported in a future release.

Specifications

[general]	Form Factor	6U CompactPCI bus card	
	Processors	IBM PowerPC 405GP Embedded Controller with 32 MB FLASH, 64 MB SDRAM	
		Four Xilinx XC2V6000-5 Virtex-II FPGAs with 128 MB DDR-SDRAM per Virtex-II FPGA node	
[buses]	Host Board	CompactPCI bus: 32-bit /66 MHz All Virtex-II processors are connected to each other – for performance see below	
[external interfaces]	*flex*Fabric	Six 320 MB/s *flex*Fabric Serial RapidIO links (to cPCI backplane)	
	Ethernet	10/100-BaseT Ethernet supported via either: PICMG 2.16 packet switched backplane or front panel	
	Serial Port	RS-232 port of embedded controller is routed to the front panel, 9 pin DSUB	
	User-defined I/O	Sixteen user-defined pins from each Virtex-II FPGA routed to front panel	
[performance]	Peak Data Transfer Rates	Between TM1 interface and each Virtex-II FPGA	640 MB/s
		Between Virtex-II FPGA processors	400 MB/s
		Virtex-II FPGA to SDRAM	780 MB/s (continuous) 484.6 MB/s (interleaved)
		From PRO-3100 to other boards via *flex*Fabric	320 MB/s per link
		Virtex-II FPGA to embedded controller	10 MB/s
[software]		Please refer to the SDR-3000 datasheet	
[electrical]	Power	+3.3V Supply Voltage: 21A (70W) +5.0V Supply Voltage: 1.5A (quiescent 7.5W) Total current consumption available for user cores (PRO-3100-xc2v6000) is 8.5A (42.5W)	
[mechanical]	Size	160 mm (height) x 233 mm (length)	
[environmental]	Temperature	Operating temperature range of 0 to 45 °C, forced air cooling of 600 LFM	
[quality]	MTBF	228,022 hours	
[ordering Information]		600-00422 PRO-3100-XC2V6000	
[custom configurations]		For custom configuration options, please contact Spectrum Sales	

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SPECTRUM SIGNAL PROCESSING

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