



Product Information Sheet

X-PORT

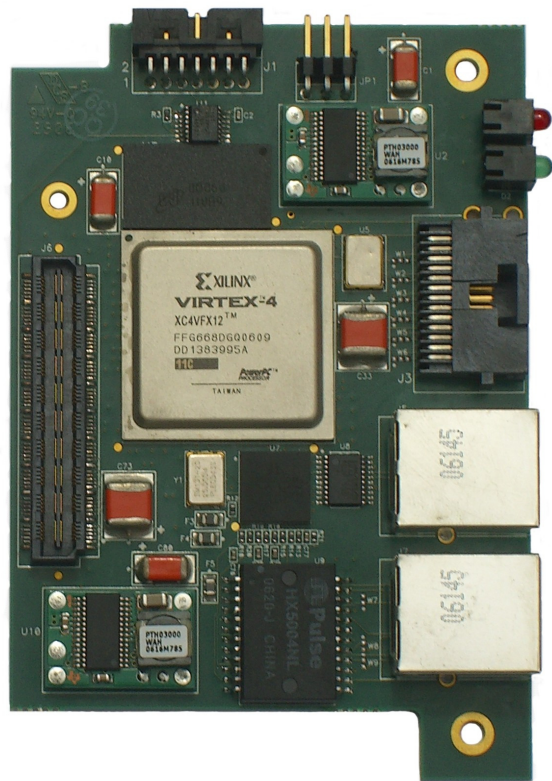
Multi-port Interface for PMP1000

FEATURES

- High-speed direct data I/O for PMP1000
- 10/100/1000 Ethernet port (RJ-45 Connector)
- RS-232 port (RJ-45 Connector)
- Digital I/O with up to 19 user defined signals
- FPGA-based PowerPC
- User-programmable Xilinx Virtex-4 FX12 FPGA
- Example source logic provided for using GbE, RS232 and Digital I/O Connector with PMP1000 applications

APPLICATIONS

- Injecting position and/or time data into PMP1000 signal data stream for processing
- Real-time control of external system devices
- Pre-process via FPGA/PowerPC the DSP input data
- Post-process via FPGA/PowerPC the DSP output data
- High-speed connectivity to user network
- Remote monitoring PMP1000 status via a Web server



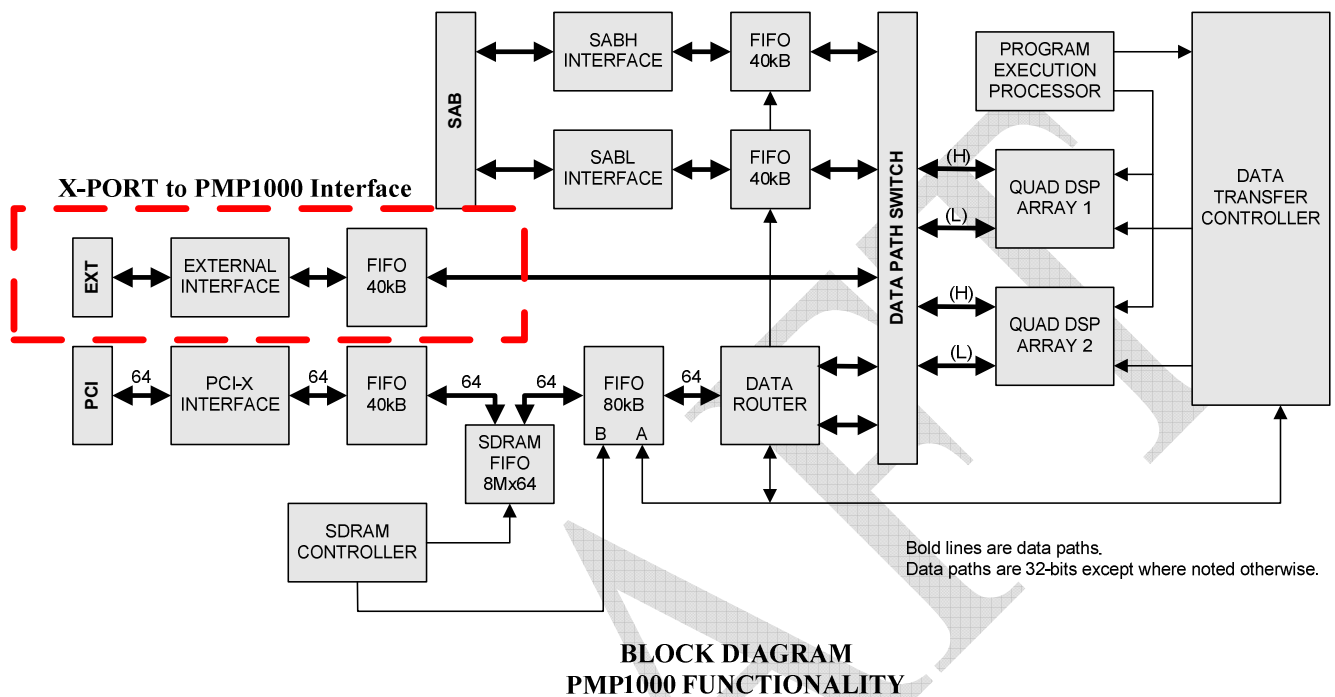
OVERVIEW

X-PORT is a multi-functional daughter board plug-in module for the Signatec PMP1000 parallel processing DSP board. Its primary function is to increase flexibility for PMP1000-based applications for both connectivity and data processing. With its onboard RS232 and Ethernet port, the module has 2 widely used interfaces for connecting the PMP1000 to other system devices and/or networks. The module also has a general purpose 26-pin parallel port with the I/O pins connected directly to the onboard FPGA that can be used to connect to custom logic or to interface to other devices in the system via software running on the embedded PowerPC.

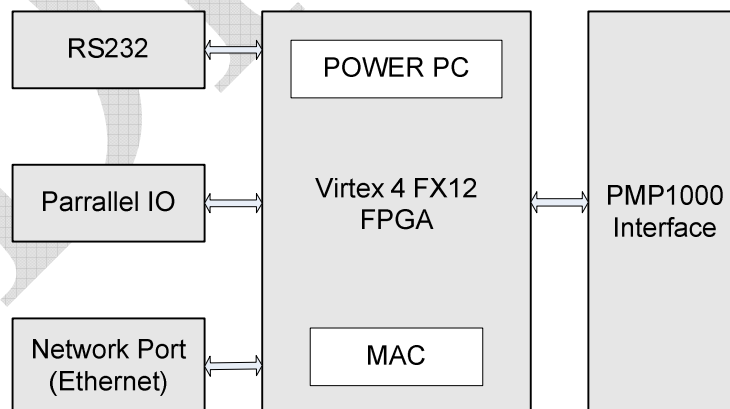
In addition to the connectivity flexibility, X-PORT also offers significant processing capabilities with the onboard Virtex-4 FX12 FPGA. Customers can program the FX12's on-chip logic and the embedded PowerPC processor using commercially available development tools. Real-time debugging is accessible via the JTAG port at the top of the card.

HARDWARE DESCRIPTION

X-Port to PMP1000 Block Diagram Interface



X-PORT Simplified Block Diagram



X-PORT Simplified Block Diagram

Digital Parallel I/O Interface

The digital parallel I/O interface connection is via a 26 conductor ribbon cable. The interface is typically set up as 13 signal wires with a ground wire between each. This provides good isolation and consistent impedance.

Optionally, the board may be ordered with 19 signal wires and 7 ground wires. This option is primarily intended for applications based on 16-bit data transfers. This option allows for three control signals along with the 16 data bits.

From top to bottom, the wires are numbered 1 through 26. The table below shows the signal connections.

Wire #	Signal	Wire #	Signal
1	GND or PD13	14	PD6
2	PD0	15	GND
3	GND or PD14	16	PD7
4	PD1	17	GND
5	GND or PD15	18	PD8
6	PD2	19	GND
7	GND or C1	20	PD9
8	PD3	21	GND
9	GND or C2	22	PD10
10	PD4	23	GND
11	GND or C3	24	PD11
12	PD5	25	GND
13	GND	26	PD12

The signals connect directly to the FPGA and can be configured for any logic level supported by the FX12 FPGA. The default is LVTTTL. In general, how the signals are used is determined by user FPGA programming. A standard data interface design is also available.

RS-232 Interface

The X-PORT module provides a RS232 interface with RX and TX signals via a DB9 connector wired as a null modem.

Ethernet Interface

The X-PORT module provides a 10/100/1000 Ethernet port for network connection. This interface uses the Virtex-4 hard core 10/100/1000 MAC.

SOFTWARE, SYSTEM, AND PERFORMANCE DETAILS

Software

X-PORT ships standard with logic programs that allow for using the Ethernet, RS232 and 26-pin parallel bus for general I/O purposes. In other words, users can plug in the X-PORT module directly to their PMP1000 board, run the provided downloadable logic and use the Ethernet and RS232 ports with their PMP1000 applications with no logic programming of their own. The logic source files for these example programs are also provided so customers can create their own custom applications that utilize the X-PORT's connection resources.

Customers can develop for the X-PORT using development tools such as Xilinx WebPACK software (downloadable on the Xilinx website and currently free), Xilinx Foundation Integrated Software Environment (ISE), Xilinx Embedded Development Kit (EDK) and Xilinx System Generator. The System Generator software can be helpful for developing data processing logic, where add-on software packages from MATLAB can be used to create FIR and/or FFT processing routines (just to name a few) that can be run on the FX12 FPGA.

Custom logic programs created by customers can be loaded onto the X-PORT and debugged via the onboard JTAG interface. Once the custom logic program has been finalized, customers will typically convert their final built logic file to type XSVF and use the standard PMP1000 software routines for programming the X-PORT's FPGA via the PMP1000's PCI bus upon PC power-up.

X-PORT Performance Capabilities

The X-PORT module has the capability to be not only a flexible product, but a high-speed product as well. The gateway in and out of the X-PORT to/from the PMP1000 is a 500 MB/s parallel bus (for one direction at any moment in time). Data can theoretically be streamed into the X-PORT from the PMP1000 at about 200 MB/s for FPGA processing and then routed back to the PMP1000's DSPs, or external busses, at this same throughput rate. For example, this would be ideal for applications that use the FPGA for FFT or filter pre-processing.

Another high-speed possibility is to use the X-PORT's 26-pin digital I/O connector for creating a parallel bus that receives data at up to 500 MB/s and stream this data continuously into the PMP1000. In this manner, the X-PORT/PMP1000 system can be used as a high-speed digital recorder, a high-speed digital processor or a combination of processing/recording.

Finally, using the Ethernet port, rates of about 90 MB/s can be achieved for networks that are setup to handle such throughputs. This might not be fast enough for all data processing applications, but it's certainly fast enough for applications that are more processing intensive with lower data I/O requirements. This can also be helpful for applications that need autonomous processing with status information delivered via network.

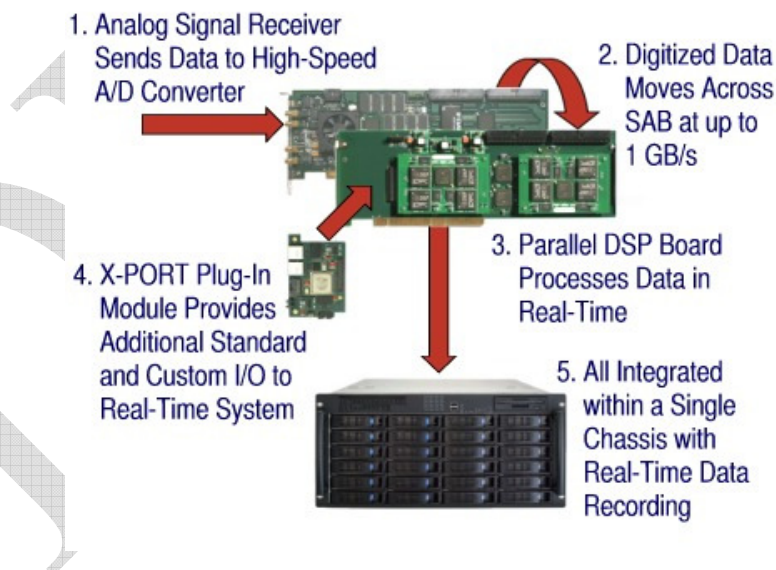
Applications

Typical Applications for the X-PORT

The X-PORT module has many uses for many different types of applications. Below are a few examples for how X-PORT can add significant features and value to customer applications:

- Real-time data acquisition and signal processing systems where time and/or position information must be combined with the analog record for data processing
- Real-time data acquisition and signal processing systems where control signals must be sent in real-time to other pieces of equipment in the system
- Real-time data acquisition and signal processing systems that must be network-based
- Real-time data acquisition and signal processing systems that use the FPGA as a pre-processor before sending data to the DSPs for post processing routines—ideal for creating a pipeline of FFT or digitally filtered data
- Creating a custom parallel bus digital recording system using the onboard 26-pin digital I/O bus
- Any general purpose high-speed DSP processing system where Ethernet is the preferred data I/O mechanism

Typical X-PORT Real-Time System Application



X-PORT SPECIFICATIONS AND ORDERING INFORMATION

External Signal Connections

Ethernet – RJ-45
RS232 – RJ-45
Digital I/O – 26 pin Ribbon Connector (2x13)
Download / Debug – 14 pin connector

Clocks

Power PC : 300 MHz
PMP1000 Interface : 133 MHz

Digital I/O Port

Type : User programmable; default is LVTTL
Signal Lines : 13 (or 19 for option A)
Max. Frequency : 125 MHz

Ethernet Port

Type : 10/100/1000
Max Rate : TBD

RS232 Port

Max. Rate : TBD

JTAG Port

Type : 14 pin header

Memory

Current Version only has FPGA Block RAM

Power Requirements

+3.3V : TBD Amps max.
+1.2V : TBD Amps max.

Absolute Maximum Ratings

Ambient Temperature : 0 to 50 °C

X-PORT Part Numbers

Order:

X-PORT-options

Options: sequentially list the letter code for any option listed below.

A – Configure Digital I/O for 19 signals. Standard is 13 with 13 grounds.

B – Replace 26 pin I/O connector with 2 SMA connectors.

C – Replace Ethernet port with second RS-232 port.

Documentation & Accessories

X-PORT is supplied with a comprehensive operator's manual, which thoroughly describes the operation of both the hardware and the software. Interface cables may be purchased. Supplied software disks contain a function library for Microsoft Visual C/C++, example programs, example logic for Virtex 4 FX12 FPGA and all source code to libraries, examples and logic.

Customer Support

The Signatec Web Site: www.signatec.com is the primary access point for software updates, documentation updates, or technical support. For the best technical support it is very important to follow the instructions on the technical support page.

Product Warranty

All Signatec products carry a full 3-year warranty. During the warranty period, Signatec will repair or replace any defective product at no cost to the customer. This warranty does not cover customer misuse or abuse of the products or physical damage not reported within 15 days of the time of shipment by Signatec.

Notes:

Data Sheet - Date 01-08-06