Flexible Application Design with ADSP-21160 Processing Power

BittWare's Reef-PMC+ (RFPM) is a reconfigurable FPGA board combining the power of the XILINX Virtex-II FPGA and the Analog Devices ADSP-21160 SHARC® DSP. Configurable for nearly any application, the RFPM allows system designers to take advantage of both the flexibility of a reconfigurable FPGA and the processing power of a general-purpose DSP. The Virtex-II features up to 1 million system gates, a flexible digital I/O interface, and reconfigurable computing blocks. And the ADSP-21160 DSP provides additional I/O and processing power for the board. Rounding out the RFPM's feature set are a 64/66 PCI interface, a 64-512 MB bank of SDRAM, and 2 MB of Flash memory.

XILINX Virtex-II Reconfigurable FPGA

The Virtex-II reconfigurable FPGA from XILINX is a powerful tool for designing custom digital interfaces based on IP cores and customized modules. The RFPM features a flexible digital I/O interface that provides up to 140 user I/O pins, each of which is individually configurable for any of nineteen single-ended I/O standards and six differential I/O standards, including LVDS, SSTL, HSTL II, and GTL+. Any two I/O pins can be used as a differential pair, providing maximum board layout flexibility. The Virtex-II is configured on power-up by the host or an on-board EPROM, and it supports reconfiguration "on-the-fly" from either the host or the ADSP-21160 DSP.

BittWare's SharcFIN ASIC

The SharcFIN ASIC provides a full 64-bit 66 MHz master PCI interface, flexibly interfaces the ADSP-21160 to peripherals such as the Flash, and implements an extensive flag and interrupt multiplexer. It also provides a full-featured SDRAM controller to interface the SDRAM to the DSP, the Virtex-II, and the PCI host.

I/O Options

The Virtex-II can send and receive data via the SharcFIN, which provides the 64/66 PCI interface, or via a high-density 68-pin I/O connector on the front panel. The Virtex-II also supports two link ports and a serial port that connect it directly to the ADSP-21160, allowing the DSP to move data between the Virtex-II and the host via the PMC+ interface. A local parallel bus gives the Virtex-II high-speed access to the SDRAM, the SharcFIN, and the ADSP-21160.

In addition to the 68-pin front panel I/O connector, two optional I/O connectors are also available. One provides 68 pins of I/O, and the other provides 4 pins of I/O for a total of 140 user I/O pins. Both 68-pin connectors are available with optional LVDS input terminations, either 34 pairs or 17 pairs.

Available Development Tools

BittWare offers complete software development tools that allow designers to easily develop application code and integrate the RFPM into their systems. XILINX also provides a complete suite of development tools for the Virtex-II. Please note that the end user is responsible for generating, assembling, and debugging all application-specific FPGA design for the Virtex-II; however, custom FPGA design is also available from BittWare.
BOARDS ARCHITECTURE

XILINX Virtex-II FPGA (XC2V1000)
- 1 million system gates
- Up to 140 user-accessible I/Os, depending on connectors installed (68 + 68 + 4)
- Supports 19 single-ended standards and 6 differential standards
- SRAM-based in-system configuration via EPROM or host

XILINX I/O Options
- Two link ports and a serial port from Virtex-II to ADSP-21160
- Local parallel bus with high-speed access to SDRAM, SharcFIN ASIC, and ADSP-21160
- 68-pin high-density (SCSI-II type) connector for I/O to/from Virtex-II (connector A)
- Optional LVDS input terminations available
- 32 pins of connector A are 5 volt tolerant
- Optional 68-pin (connector B) and 4-pin (connector C) I/O connectors (require second slot; violates PMC single slot spec.)

JTAG Interface
- Optional JTAG connectors for in-circuit emulation of ADSP-21160 and configuring of Virtex-II

ADSP-21160 DSP
- 80 MHz Analog Devices ADSP-21160 SHARC DSP
- 4 Mb of on-chip dual-ported SRAM
- Integrated I/O processor with fourteen-channel DMA controller, six 80 Mbyte/sec link ports, and two 40 Mbit/sec serial ports
- PMC+ extensions provide four link ports and a TDM serial bus directly to ADSP-21160

SharcFIN™ ASIC
- 64/66 MHz PCI rev. 2.2 compliant interface (528 burst)
- SDRAM controller on SHARC bus; supports up to 512 MB
- SDRAM mapped into PCI memory space
- Supports host- and Flash-based booting of ADSP-21160

On-Board Memory
- 64-512 MB SDRAM (standard 144-pin SODIMM)
- 2 MB Flash memory for hostless boot or non-volatile storage

Power
- 10W @ 3.3V worst case; 3 A max current
- 0.5W @ 5V worst case; 100 mA max current

Size
- 74mm × 149mm PMC form factor

SOFTWARE SUPPORT

Host Interface
- BittWare’s software development kit for Windows® 95/98/NT/2000 and Linux contains a C-callable library of board control and communications routines
- Porting kit available for other operating systems platforms

Development Tools
- Analog Devices’ VisualDSP tools: C compiler, assembler, linker, simulator, and debugger
- VisualDSP Target for on-board ADSP-21160 debugging from host without an ICE
- Analog Devices ICE emulators*
- BittWare SharcLAB interface to MATLAB, Simulink®, Stateflow®, and Real-Time Workshop®
- BittWare SpeedDSP ADSP-21xxx optimized function libraries
- XILINX Multilink cable support**

Ordering Information

RFPM-XYZ-ABCDE

X: DSPs
- 0 = No DSP
- 1 = 1 DSP
Y: SDRAM
- 5 = 64 MB
- 6 = 128 MB
- 7 = 256 MB
- 8 = 512 MB
Z: Virtex-II
- 3 = XC2V1000

E: PMC+ Connector
- 0 = Not populated
- 1 = Populated

D: JTAG Connectors
- 0 = Not populated
- 1 = Populated**

C: I/O Connector Grounding
- 0 = No ground
- 1 = Ground 4 corners on connectors A and B

B: I/O Connectors B & C**
- 0 = Not populated
- 1 = No terminations
- 2 = 34 pairs LVDS input terminations
- 3 = 17 pairs LVDS input terminations

A: I/O Connector A
- 1 = No terminations
- 2 = 34 pairs LVDS input terminations
- 3 = 17 pairs LVDS input terminations
- X = Custom†

* Currently unavailable
** Requires optional JTAG connectors
† Violates PMC height spec for single slot
‡ Contact BittWare
Netherlands: Andreas Kohl
Electronic Tools
Am Waldfriedhof 7
Ratingen
D-40889, Germany
Tel: +49 2102 8801 32
Fax: +49 2102 8801 93
andreas.kohl@etools.de
www.etools.de

New Zealand: Philip Montgomery
Electro-Optics Pty Ltd
Level One, 1 Nelson Street
Kenthurst
New South Wales
2156 Australia
Tel: +61 2 9654 1873
Fax: +61 2 9654 1539
Philmo@electro.com.au
www.electro.com.au

Norway: Øyvind Fjell
Metric A.S.
PO Box 164, Holmlia
Nordasveien 5
N-1203 Oslo
Norway
Tel: +47 2976 4000
Fax: +47 2976 4050
oyvind.fjell@metric.no
www.metric.no

Philippines: Mostafa Rastin
Neurotech
59F Science Park Drive
The Fleming
Singapore 118245
Tel: +65 6773 4300
Fax: +65 6777 5606
rastin@neurotech.com.sg
www.neurotech.com.sg

Poland: Andreas Kohl
Electronic Tools
Am Waldfriedhof 7
Ratingen
D-40889, Germany
Tel: +49 2102 8801 32
Fax: +49 2102 8801 23
andreas.kohl@etools.de
www.etools.de

Portugal: Martin Villen
TGA Ingenieria Y Electronica, S.A.
C/ Isabel Colbrand
10 NAVE-199
28050 Madrid Spain
Tel: +34 91-3589922
Fax: +34 91 3589493
martin.villen@tga.es
www.tga.es

Russia: Sergey Kuznetsov
RTSoft Co
PO Box 158
105077 Moscow
Russia
Tel: +7 095 749 6828
Fax: +7 095 749 6899
kuznetsov@rtsoft.msk.ru

Singapore: Mostafa Rastin
Neurotech
59F Science Park Drive
The Fleming
Singapore 118245
Tel: +65 6773 4300
Fax: +65 6777 5606
rastin@neurotech.com.sg
www.neurotech.com.sg

Spain: Martin Villen
TGA Ingenieria Y Electronica, S.A.
C/ Isabel Colbrand
10 NAVE-199
28050 Madrid Spain
Tel: +34 91 3589922
Fax: +34 91 3589493
martin.villen@tga.es
www.tga.es

Switzerland: Andreas Kohl
Electronic Tools
Am Waldfriedhof 7
Ratingen
D-40889, Germany
Tel: +49 2102 8801 32
Fax: +49 2102 8801 23
andreas.kohl@etools.de
www.etools.de

Sweden: Anders Degselius
Metric Industrial Electronics AB
PO Box 66
Solna, 171-74
Sweden
Tel: +46 8 635 1000
Fax: +46 8 635 1001
Anders.Degselius@metric.se
www.metric.se

Taiwan: Yeeching Lee
Insurewin Technology Corp.
5F-1, No. 175, Sec. 3, Hsin-Yi Rd.
Taipei Taiwan 106 R.O.C.
Tel: +88 629 784 44 11
Fax: +88 629 709 34 18
Yeeching@seed.net.tw
www.insurewin.com

United Kingdom: Nigel Norman
Sarsen Technology Limited
Lloran House, High Street
Marlborough
SN8 1HQ Wiltshire
United Kingdom
Tel: +44 1672 5111 66
Fax: +44 1672 5111 77
nigel.norman@sarsen.net
www.sarsen.net

United States: George Allie
BittWare, Inc.
31B South Main St.
Concord, NH 03301
Tel: 1-603-226-0404
Fax: 1-603-226-6667
gallie@bittware.com
www.bittware.com

Vietnam: Mostafa Rastin
Neurotech
59F Science Park Drive
The Fleming
Singapore 118245
Tel: +65 6773 4300
Fax: +65 6777 5606
rastin@neurotech.com.sg
www.neurotech.com.sg