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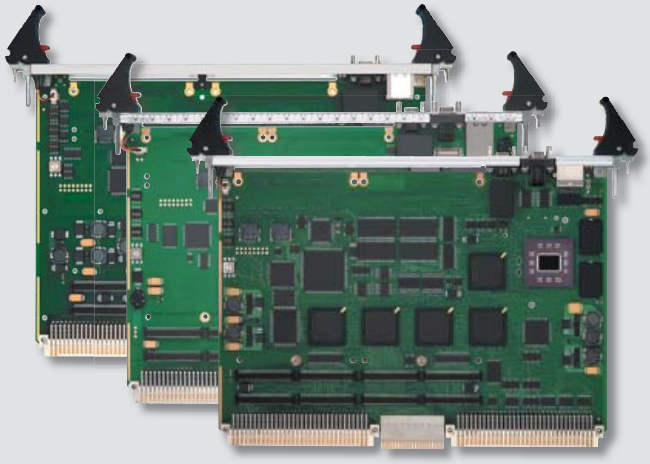
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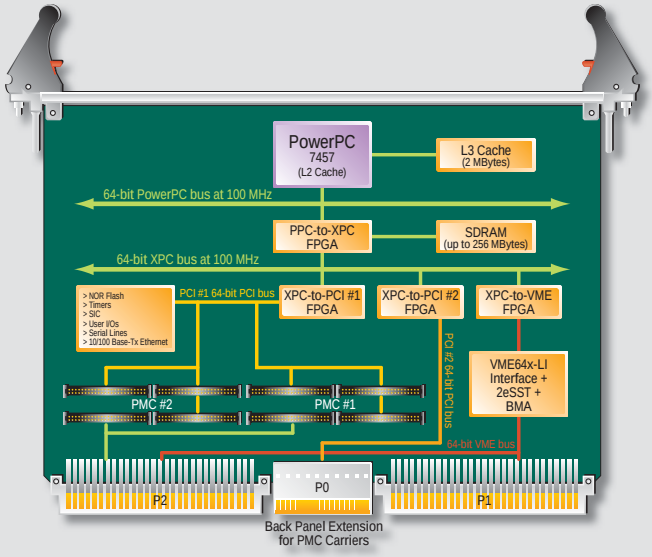
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VME PROCESSOR BOARDS

RIO3 8064

PowerPC-Based 6U VME 2eSST Twin PCI Bus Real-Time Processor Board





HIGHLIGHTS

BRUTE FORCE POWER

- PowerPC 755 at 366 MHz
- PowerPC 750 at 500 MHz with 1 MByte external L2 cache
- PowerPC 7410 at 500 MHz with 2 MBytes external L2 cache
- PowerPC 7455 at 800 MHz with 2 MBytes external L3 cache

GLOBAL MEMORY AT CACHE SPEED

- Up to 2 GBytes SDRAM at 800 MBytes/s peak

TWIN 64-BIT PCI BUS ARCHITECTURE

- Two onboard dual PMC slots
- Transparent multiprocessing

VME64X-LI 2ESST BUS AT 180 MBYTES/S

- CES-designed PowerPC-to-VME64x 2eSST bridge

TOTALLY UNDER CONTROL

- CES-designed direct PowerPC-to-PCI bridges
- Optimized bus architecture for maximum bus bandwidth
- Multiple arbiters for memory bandwidth allocation
- User-controlled interrupt strategies
- Remotely controllable with CES-designed reprogram and reconfiguration toolkit
- JTAG 1149-1 support

TOTALLY SCALABLE

- PCI based on VME backplane P0 connector
- Up to six PMCs (CES computing cores) controlled by the same RIO3 8064

NATIVELY MULTIPROCESSOR ORIENTED

- High-speed synchronization and message passing
- Global shared memory
- Independent sixteen-channel VME linked list DMA

STATE-OF-THE-ART SOFTWARE

- BSPs for LynxOS®, VxWorks®, Integrity®, TimeSys® and Linux® with CES-enhanced specifications
- Network protocols on PCI and VME (TCP/IP and high-speed channel mode - CES BP-Net)

ADDITIONAL FEATURES

- 16 MBytes of Flash EPROM
- Full duplex 10/100 Base-Tx Ethernet
- Two serial interface ports (RS-232)
- PMC voltage protection logic

GENERAL DESCRIPTION

The RIO3 8064 confirms CES' choice of the winning combination for real-time applications: PowerPC CPU and PCI backbone bus.

The RIO3 8064 has been designed to provide a function-level compatibility with the RIO2 8062. It offers two onboard PMC slots as well as a PMC extension system. Compared to the RIO2 8062, it provides a massive speed improvement (by a factor of four), due to an extremely fast global memory and a bandwidth control logic, which allocates the throughput between the CPU, the VME and the two 64-bit PCI buses. The RIO3 8064 features FPGA-based CES-designed PowerPC-to-PCI and PowerPC-to-VME interfaces to reduce the risk of long-term maintenance.

This machine uses the latest CPU, VME and PCI technological features, including a 2 MBytes L3 cache for the PowerPC 7455, direct VME-to-memory interface with an ultra-fast VME64x extension and two independent PCI buses with one directly available on the P0 connector.

It also follows all of the recommendations of the telecom requirement: Live Insertion, JTAG test bus and a comprehensive set of software maintenance tools.

The RIO3 8064 combines 180 MBytes/s bandwidth on VME with 400 MBytes/s global memory bandwidth shared between the different buses. All of these features are totally equipped with an advanced API, which make the RIO3 8064 the ideal platform for large computing intensive applications such as aircraft simulation, test and validation, high-speed data-acquisition systems, as well as large ATM switch controllers and base stations.

The integration risk for strategic applications has been significantly reduced by the use of FPGA-based PowerPC-to-PCI and PowerPC-to-VME bridges, where all of the missing functions in existing commercial bridges have been added and fine-tuning of the application has been made possible.

VME INTERFACE

The RIO3 processor boards feature the most advanced VME interface available, with a direct path between the PowerPC bus and VME with CES-proprietary logic. This architecture optimizes the speed of direct single-shot PowerPC-to-VME or VME-to-system memory transfer. The VME custom logic incorporates VME64x as well as a high-speed 2eSST transfer mode providing 180 MBytes/s measured, under the operating system. The block transfer logic supports deep and multiple entry-write buffers and is equipped with a fast, private SSRAM for incoming and outgoing scatter / gather.

Block transfers are handled by a private block mover logic, which incorporates a sixteen-channel chained DMA controller delivering maximum VME performance with no impact on the processor performance. Broadcast and multicast transfers are available for high-speed initialization and message passing sequences.

The VME interface incorporates a full VME64x CR / CSR integration for geographical addressing and a full slot-1 function. The VME interface also includes unique extended mechanisms to provide an efficient multiprocessor operation over VME.

The RIO3 processor boards embed a hardware decoding logic for indivisible cycles on VME for fast inter-processor synchronization. VME dynamic memory mapping for efficient multiprocessor systems is allowed with a private MMU for VME pages, which are directly integrated in an FPGA, enabling dynamic memory mapping of VME for efficient multiprocessor systems. Inter-processor communication is made simple with eight user-accessible message passing FIFOs of 256 x 32-bit words.

LIVE INSERTION

The VME64x-LI specifications incorporate a Live Insertion hardware mechanism, which allows the insertion and extraction of the board under power. RIO3 processor boards comply to these specifications and can therefore be used in redundant configurations with N+1 sparing.

VME SPECIFICATIONS

DTB Master

A64, A32, A24, A16, CR / CSR, D64, D32, D16, D08, BLT32, MBLT64, 2eVME, 2eSST

DTB Slave

A64, A32, CR / CSR, D64, D32, D16, D08, BLT32, MBLT64, 2eVME, 2eSST, full VME64x CR / CSR integration

4-Level Requester

ROR, RWD, FAIR, HIDDEN

Int. Handler / Req.

Seven levels

Slot-1

SYSCLOCK, PRI, RRS, BTO, VME write-post / read-prefetch, high-speed linked lists VME DMA

SOFTWARE

The RIO3 processor boards come with PPCMon, a powerful low-level extended PowerPC monitor.

CES has ported the most popular real-time operating systems on the RIO3 processor boards (LynxOS®, VxWorks®, Integrity®, TimeSys® and Linux®). Special care has been taken to exploit all of the hardware features of the board to increase the performance of the operating system features. Several functions have been added to the standard operating system BSPs to support literally each programmable IC of the board, to provide the user with a very precise and very comfortable development environment. Amongst them, CES BP-Net, which is installed by default as the standard multiprocessing package. It provides a high-performance inter-processor communication / synchronization and is available over VME and PCI through a common API. Network services such as TCP/IP are also available with CES BP-Net.

CES' philosophy is to offer a BSP, which is independent from the operating system. This means it will offer the user a complete set of functions accessing nearly all of the clusters or VHDL blocks on the board, which is the same for all supported operating systems. Portability of the application is therefore guaranteed for the user. CES can also assist in the portability study, as well as its realization.

VERSIONS AVAILABLE

RIO3 8064L	PowerPC 755 at 366 MHz (one PCI bus)
RIO3 8064M	PowerPC 755 at 366 MHz (two PCI buses)
RIO3 8064A	PowerPC 750 at 500 MHz, 1 MByte L2 cache
RIO3 8064B	PowerPC 7410 at 500 MHz, 2 MBytes L2 cache
RIO3 8064W	PowerPC 7455 at 800 MHz, 2 MBytes L3 cache

RELATED CES PRODUCTS

MFCC 8442	PrPMC
MFCC 8443	PrPMC
MFCC 8444	PrPMC
MFCC 8445	PrPMC
GPIO 8405	User-Programmable I/O PMC
PEB 6416	VME PMC Extension Board

For more detailed information about any of our products, please do not hesitate to contact us.

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CREATIVE ELECTRONIC SYSTEMS

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