PowerMIDAS

PMC I/O Subsystem for VMEbus & RACE++/RACEway

Introduction

The PowerMIDAS series are unique PMC I/O Subsystems for the 2nd generation RACE++ version of RACEway, as well as for the original RACE 1.0. The boards carry two to five PMC modules with an architecture optimized for high bandwidth flowthrough applications, with two separate 64-bit PCI buses. Each PCI bus may be equipped with its own PXB++ interface to the RACE++ crossbar network, providing support for the Dual-port RACE (with the 5-row DIN connector).

The boards are offered in different versions, with a choice of i960RN or PowerPC processor architectures and with various PMC configurations. There is also a choice of ready-to-run Fibre Channel or Parallel I/O solutions for Mercury's RACE/RACE++ series (MIDAS RX, preprogrammed boards bundled with appropriate PMC modules and MC/OS™ API). Finally, a VxWorks environment allows customers to make their own I/O solution based on the vast number of PMC modules available on the market.

PowerMIDAS interfaces to the RACE++ crossbar, offering parallel datapaths with up to 266 MB/s between compute, memory and I/O nodes!

Features

- **266 MBytes/sec RACE++ 2nd generation RACEway compatible**
- **Dual-Port RACE using two PXB++ (optional)**
- **Twin 64-bit PCI buses each with 266 MBytes/sec bandwidth**
- **100MHz i960RN I/O processor with 532 MBytes/sec Local Memory bandwidth**
- **Twin i960RN version gives > 1 GByte/sec Memory bandwidth**
- **One or two MPC 8240 PowerPC allows protocol-intensive I/O processing**
- **"Swinging Buffers" operation for continuous Data Acquisition applications**
- **Onboard Ethernet Interface**
- **Ruggedized and External temperature versions available**

- **MC/OS™ support with "DX"-like API for selected PMC modules**
- **VxWorks® BSP available**

Applications

PowerMIDAS is designed to solve the most demanding I/O requirements in RACE++/RACEway systems, in particular for applications such as:

- Sensor Data Acquisition (Radar/Sonar)
- Imaging
- Digital Signal Processing

DSP System using PowerMIDAS for Sensor I/O, Recording and Readback

i960RN: maximum MB/s for streaming oriented applications

A central element of the PowerMIDAS is the Intel i960RN processor. The highly integrated i960RN contains a powerful 100 MHz RISC I/O processor, two 64-bit PCI bus ports with an on-chip PCI-to-PCI bridge, an ultra-fast 532 MB/s SDRAM memory interface and powerful flexible DMA-controllers with linked-list capability. The 1200 series contains a single i960RN and is available in two PMC configurations. The SR models have a symmetrical PMC layout, i.e. one PMC on each PCI bus. The MR version has both PMCs on the secondary PCI bus (see figures below).

Dual i960RN

For applications that need extreme memory bandwidth or extra processing power, PowerMIDAS is also available with two 100 MHz i960RN processors, giving an astonishing 1 GByte/sec total memory bandwidth (2000 series). Each i960RN has a 64 or 128 MByte SDRAM with ECC, and 2 MByte FLASH memory. The second i960RN is placed on a daughtercard together with 64 MB of SDRAM. Thus, 1200 models can be field upgraded to 2200 models.

PowerPC: maximum MIPS for custom I/O solutions (VxWorks) and protocol-intensive applications

The PowerMIDAS 3000 series is offered with one or two 250 MHz PowerPC MCP8240 processors. Each of these processors are attached to a 2 MByte FLASH and a 64 MByte SDRAM with ECC and an ultra-fast 64-bit 83 MHz (664 MB/s) memory interface. In addition, the board has one i960RN acting merely as a PCI bridge and providing a high-bandwidth (532 MB/s) shared memory of 64 MB (normally this CPU is not running any code). The PowerPC is an attractive solution for customers who want to program their own I/O solution based on the widely used VxWorks and PowerPC architecture, taking advantage of the wide variety of PMC cards that are available on the market for VxWorks/PPC drivers.

VxWorks®

To facilitate custom advanced real-time applications, VMETRO offers VxWorks® board support packages for both i960RN and PowerPC. This allows running drivers for a variety of I/O devices from a number of vendors.

Onboard Ethernet Interface

PowerMIDAS provides an onboard Fast Ethernet Interface to give a direct connection to a network. This simplifies software development and eliminates the need for using a PMC slot for the network connection.

3.3V power to PMCs

PowerMIDAS provides onboard 5V-to-3.3V power converters that supply 3.3V power to the CPUs, SDRAM as well as the PMC positions on the board. This allows the use of practically all PMC modules on the market.

Ruggedized versions

VMETRO offers ruggedized versions of selected models of PowerMIDAS, characterized for extended temperature, shock, vibration, altitude and humidity. These boards are equipped with extra and/or special hardware to improve tolerance to shock and vibration. (See specifications.)

MIDAS RX2 for Mercury - MC/OS™ support with DX-like API

PowerMIDAS is also used in the MIDAS RX2 family of ready-to-run I/O solutions for Mercury MC/OS™. With a DX-like API, MIDAS RX2 allows PMC I/O functions to be accessed from an MC/OS application with virtually no integration effort by the customer and with no need for any third-party OS or software development tools.

Functions offered in the MIDAS RX2 series are:

- **RX2-MDR** Fibre Channel RAID/JBOD Controller for RACE++/RACEway
- **RX2-FCNET** Fibre Channel Network Controller for RACE++/RACEway
- **RX2-VIDEO** Video Frame Grabber & Display for RACE++/RACEway
- **RX2-DPIO** Parallel I/O (FPDP/ECL/RS422/LVDS) for RACE++/RACEway

PowerMIDAS Models Overview

PowerMIDAS-1200S series

For streaming oriented applications: One i960RN I/O Processor and up to 532 MBytes Memory Bandwidth!

RACEway models:
M1200SR/64
M1200SR/128
M1200SR2/128 (Dual RACE++ ports)

Non-RACEway models:
M1200S/64
M1200S/128

PowerMIDAS-2200S series

For streaming oriented applications: Two i960RN I/O Processors and up to 1 GByte/s Memory Bandwidth!

RACEway models:
M2200SR/128
M2200SR/256 *(128MB Option: Please consult factory)*
M2200SR2/128 (Dual RACE++ ports)
M2200SR2/256 (Dual RACE++ ports) *(128MB Option: Please consult factory)*

Non-RACEway models:
M2200S/128
M2200S/256 *(128MB Option: Please consult factory)*

Daughtercard to upgrade 1200 to 2200 series:
MDC960RN/64

PowerMIDAS-32x0S series
For protocol-intensive applications, or custom I/O solutions: One or Two PowerPCs and one i960RN for maximum I/O processing power!

RACEway models:
M3210SR/128 (One PPC)
M3210SR/192 (One PPC)
M3220SR2/192 (Two PPCs, Dual RACE++ ports)

Non-RACEway models:
M3210S/64 (One PPC)
M3220S/192 (Two PPCs)

PowerMIDAS-1200MR

Single i960RN with both PMC modules on the secondary PCI bus, suitable for redundant PMC functions.

RACEway models:
M1200MR/64
M1200MR/128

PowerMIDAS-2500 series

Five PMC positions, occupying two VME slots, for maximum number of PMCs!

RACEway models:
M2500R2/128 (Dual RACE++ ports)

M2500R2/256 (Dual RACE++ ports)

Non-RACEway models:
M2500/128
M2500/256

PowerMIDAS-3520 series
Five PMC positions version, occupying two VME slots, for maximum number of PMCs.

RACEway models:
M3520R2/256
M3520R2/384 *(128MB Option: Please consult factory)*

Non-RACEway models:
M3520/256
M3520/384 *(128MB Option: Please consult factory)*

Ordering Information

Single i960RN RACEway models:
M1200SR/64 PowerMIDAS-1200SR, Single i960RN processor, 64 MB SDRAM, Symmetrical PMCs, One RACE++ port
M1200SR/128 PowerMIDAS-1200SR, Single i960RN processor, 128 MB SDRAM, Symmetrical PMCs, One RACE++ port
M1200SR2/128 PowerMIDAS-1200SR2, Single i960RN processor, 128 MB SDRAM, Symmetrical PMCs, Dual RACE++ ports
M1200MR/64 PowerMIDAS-1200MR, Single i960RN processor, 64 MB SDRAM, Mirrored PMCs, One RACE++ port
M1200MR/128 PowerMIDAS-1200MR, Single i960RN processor, 128 MB SDRAM, Mirrored PMCs, One RACE++ port

Dual i960RN RACEway models:
M2200SR/128 PowerMIDAS-2200SR, Dual i960RN processors, 2x64 MB SDRAM, Symmetrical PMCs, One RACE++ port
M2200SR/256 *(Please consult factory.)*
M2200SR2/128 PowerMIDAS-2200SR2, Dual i960RN, 2x64 MB SDRAM, Symmetrical PMCs, Dual RACE++ ports.
M2200SR2/256 *(Please consult factory.)*
M2500R2/128 PowerMIDAS-2500R2, Five PMC positions, Dual i960RN, 2x64 MB private SDRAM, 64 MB shared SDRAM, Dual RACE++ ports.
M2500R2/256 *(Please consult factory.)*

PowerPC RACEway models:
M3210SR/128 PowerMIDAS-3210SR, Single PPC 8240 processor, 64 MB private SDRAM, 64MB shared SDRAM, One RACE++ port
M3220SR/192 PowerMIDAS-3220SR, Dual PPC 8240 processors, 2x64 MB private SDRAM, 64MB shared SDRAM, One RACE++ port
M3220SR2/192 PowerMIDAS-3220SR, Dual PPC 8240 processors, 2x64 MB private SDRAM, 64MB shared SDRAM, Dual RACE++ ports
M3520R2/256 PowerMIDAS-3520R2, Five PMC positions, Dual PPC 8240, Dual i960RN, 2x64MB private SDRAM, 2x64MB shared SDRAM, Dual RACE++ ports.
M3520R2/384 *(Please consult factory.)*

Non-RACEway models:
M1200S/64 PowerMIDAS-1200S, Single i960RN, 64 MB SDRAM, Symmetrical PMCs.
M1200S/128 PowerMIDAS-1200S, Single i960RN, 128 MB SDRAM, Symmetrical PMCs.
M2200S/128 PowerMIDAS-2200S, Dual i960RN, 2x64 MB SDRAM, Symmetrical PMCs.
M2200S/256 *(Please consult factory.)*
M3210S/128 PowerMIDAS-3210S, Single PPC 8240 with 64 MB private SDRAM, 64 MB shared SDRAM.
M3220S/192 PowerMIDAS-3220S, Dual PPC 8240, 2x64 MB private SDRAM, 64MB shared SDRAM.
M3520/256 PowerMIDAS-3520, Five PMC positions, Dual PPC 8240, Dual i960RN, 2x64MB private SDRAM, 2x64MB shared SDRAM.
M3520/384 *(Please consult factory.)*
MDC960RN/64 PowerMIDAS Daughtercard with Single i960RN, 64 MB SDRAM.

Specifications

Environmental	Commercial	Ruggedized / Extended Temperature*
Temperature Operational, at sea level	0 to 50 ºC (Forced air cooling, exit air temp.)	-40 to 55 ºC 600 ft/min air flow
Temperature Non-operational	-40 to 70 ºC	-40 to 85 ºC
Vibration Operational (Sinus)	-	10G peak, 5 - 2000Hz
Vibration Operational (Random)	-	$0.040g^2$/Hz (20-1000Hz flat, then -6dB/oct to 2000Hz)
Shock Operational	-	30G (11ms half sine), 50G (6ms half sine)

Humidity Operational	5-95% RH (non-condensing)	5-95% RH (non-condensing)
Altitude Operational	-	10 000 ft.
Sockets/Jumpers	Yes	No
IC package	Plastic	Plastic

** Preliminary: please consult factory for latest specifications.*

Power Requirements:
+5V (+5% / -2.5%): 3.0 - 5.0A (est.)
+12V (+/- 10%) 50 mA max.
-12V (+/- 10%) 0.0 mA
(All values excluding any current drawn by PMC modules)

Mechanical:
Size: 233.4 x 160mm (6U)
Weight: 390g (M3220SR/192)