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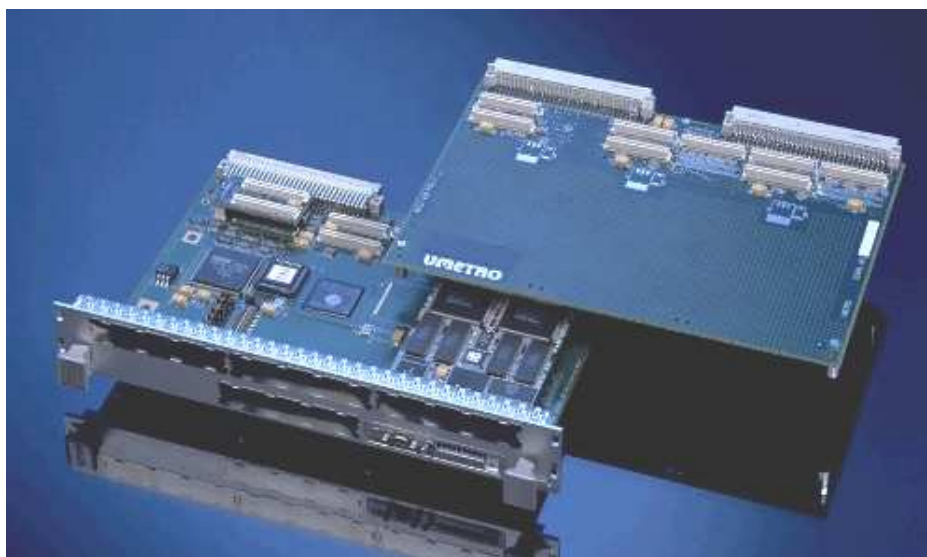
**VMETRO**

# MIDAS - PMC I/O Subsystem for VMEbus and RACEway



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## The MIDAS Family

The MIDAS series is a unique family of boards forming a complete PMC I/O Sub-system for VMEbus and/or RACEway. The boards may carry two or five PMC - PCI Mezzanine Cards, and are designed for effective integration of high-performance PCI I/O functions into a VME system. The family range from a very simple 2x PMC Carrier (MIDAS- 20), to a powerful Twin i960 & Memory 5x PMC Carrier (MIDAS-250) where twin memories and the processing power from two RISC CPUs are available.

### The MIDAS Family:

- MIDAS-20 2 x PMC Carrier.
- MIDAS-50 5 x PMC Carrier (Two VME slots).
- MIDAS-120 i960RP & Memory, 2 x PMC Carrier Intelligent I/O Sub-system.
- MIDAS-150 i960RP & Memory, 5 x PMC Carrier Intelligent I/O Sub-system. (Two VME slots).
- MIDAS-220 Twin i960RP & Memory, 2 x PMC Carrier Intelligent I/O Sub-system.
- MIDAS-250 Twin i960RP & Memory, 5 x PMC Carrier Intelligent I/O Sub-system. (Two VME slots).

To see Application Examples click [here](#).

### The PCI Mezzanine Card (PMC)

A selection of such modules suitable for the MIDAS family of boards are:

- [Digital Parallel I/O \(VMETRO\)](#)

The PCI Mezzanine Card (PMC) standard is based upon the Electrical & Logical layer of PCI (Peripheral Component Interconnect), but with a different mechanical form factor called the CMC - Common Mezzanine Card. This puts the expansion module parallel to the carrier board, especially well suited as an expansion standard for VMEbus boards. This allows VMEbus users to leverage on the plethora of inexpensive devices becoming available for the PCI-bus, offering nearly any kind of peripheral controller or bridging function with a glue-less and often single-chip solution. A large number of companies have already announced or are developing PMC products.

- SCI Bus Link (VMETRO)
- [DSP Processors](#)
- [Fibrechannel](#)
- VSB
- Fast Ethernet
- A/D Converters
- SCSI
- Serial comms.
- FDDI

For a detailed listing of other PMC cards contact [VITA](#). For another listings see [GRoupIPC, promoting IP and PMC solutions](#).

### MIDAS-20: The entry level product

The entry level product in the MIDAS family is the MIDAS-20. This is straight forward PMC Carrier for VMEbus and/or RACEway, holding two PMC - PCI Mezzanine Cards. The board is designed for cost-effective integration of PCI I/O functions into a VMEbus or RACEway system. In figure 2, the left board depicts the MIDAS-20.

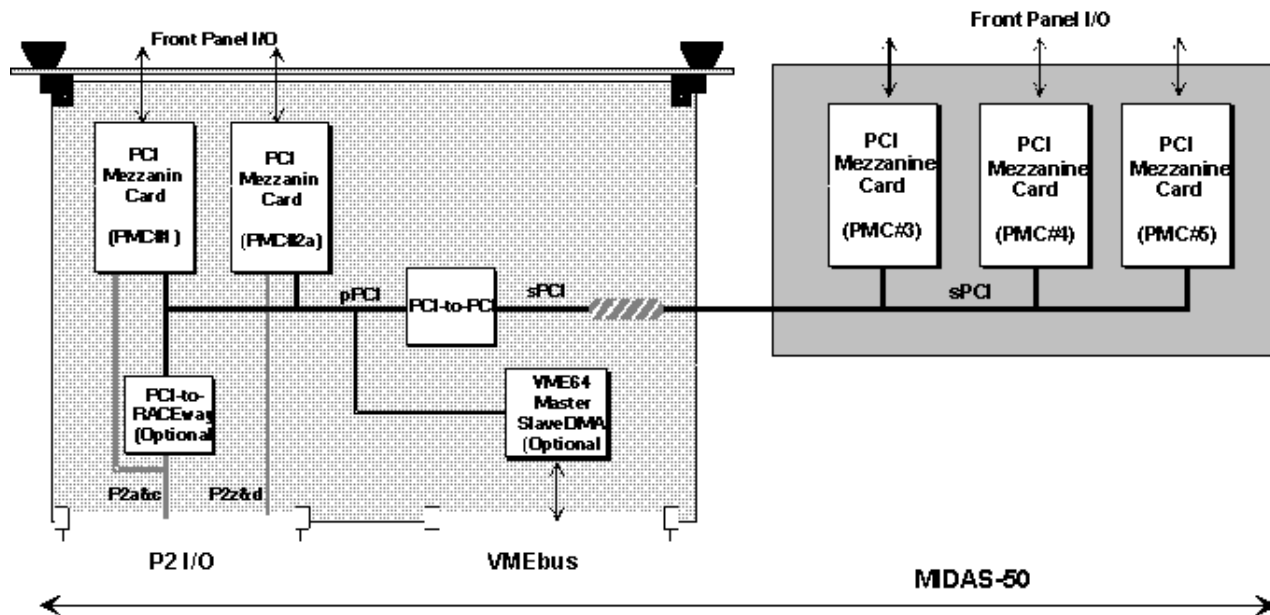


Figure 2. MIDAS-20 and -50: PMC Carrier for 2 or 5 PMC modules, for VMEbus / RACEway

### MIDAS-50: Five PMC modules

For applications that need more than two PMCs, the MIDAS-50 offers a solution. This board holds up to five PMC modules by means of a special mezzanine carrier board that goes into the second VME slot. As can be seen from the MIDAS-50 block diagram in fig. 2, a PCI-to-PCI bridge ensures that the PMC modules on the mezzanine are accessible from VMEbus / RACEway, while the PCI spec. of max. 10 loads per PCI segment is satisfied.

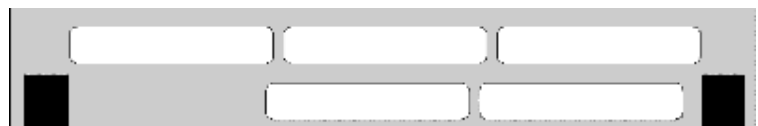


Figure 3. Front panel of MIDAS-50 with five PMC cutouts in two VMEbus slots.

## The MIDAS-100 series

The MIDAS-100 series consists of two boards, the MIDAS-120 and the -150. These are quite similar to the -20 and -50 models described above, but includes an [Intel i960RP](#) processor and a high-performance DRAM memory.

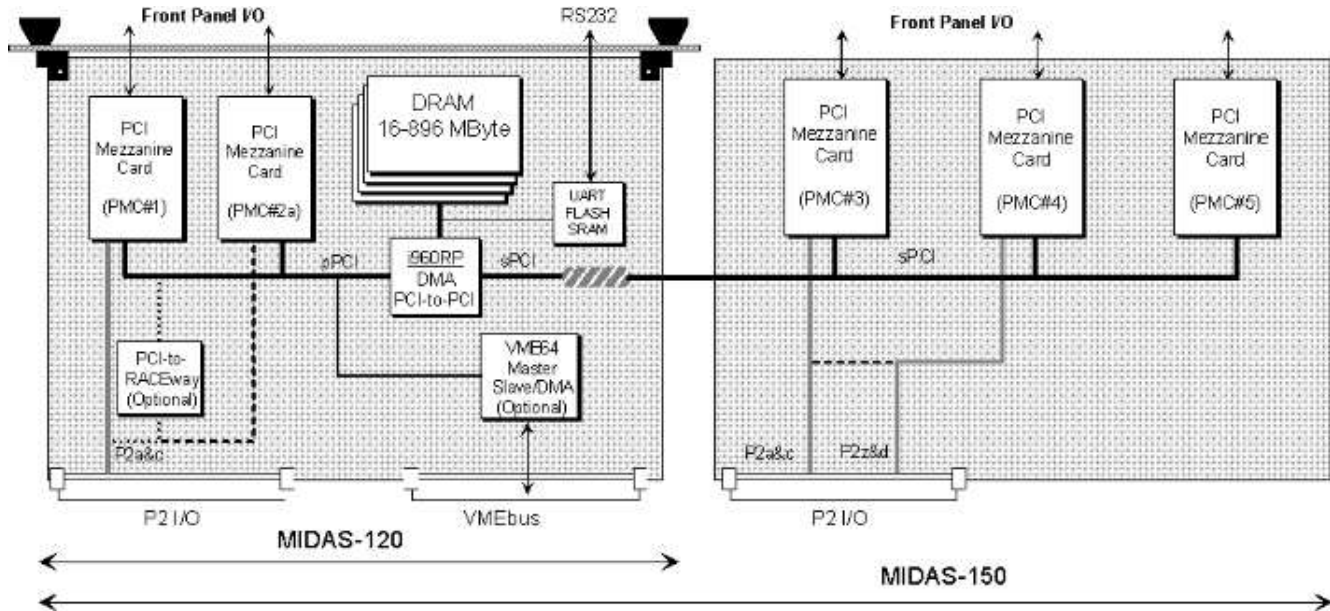


Figure 4. The MIDAS-100 series includes an Intel i960RP processor and a high-performance DRAM memory.

### i960RP I/O processor

The i960RP is a highly integrated device that contains not only a powerful RISC I/O processor, but a PCI-to-PCI bridge, memory controller and a flexible DMA-controller with linked-list capability. The i960RP has direct access to FLASH PROM, SRAM and an RS232 UART in addition to the all PCI resources on the board, and of course the DRAM. This allows it to offload the host CPU by running dedicated I/O drivers for the PMC modules mounted on the board. Real-time OS kernels like VxWorks will be offered. For applications that do not need the processing power of the i960RP, but only the DRAM memory and/or PCI-to-PCI bridge, the processor may rest idle during normal operation. In any case, the processor will offer an embedded maintenance utility for diagnostics and configuration through the serial port. For a detailed description on the i960RP contact [Intel](#).

### High-speed DRAM

The DRAM is a high-speed memory that offers zero-wait-states within data bursts. It can be from 16 to 64 MByte directly on the main board. For larger memories, the MIDAS-120 can be equipped with a separate mezzanine (taking a second VME slot) that offers up to 896 MBytes. The DRAM is accessible from both PCI busses, both with single cycles and with DMA. This means that devices on VMEbus and RACEway may access the DRAM directly as a regular slave memory.

To see Application Examples click [here](#).

## The MIDAS-200 series

The MIDAS-200 series represents the top of line models in the MIDAS family, where two [Intel i960RP](#) processors and two high-performance DRAM memories are available. This is a truly unique product, targeted at applications like Imaging, Data Acquisition and Signal Processing where maximum parallelism is desired. As with the previously described models, the -200 series also consists of two boards, the MIDAS-220 and the -250, with two and five PMC sites respectively.

### Twin i960RP I/O processors

Each of the two i960RPs of the MIDAS-200 series boards has direct access to its own FLASH PROM, SRAM and an RS232 UART in addition to the all PCI resources on the board, and of course its associated DRAM bank. This allows it to offload the host CPU by running dedicated I/O drivers for the PMC modules mounted on the board. Again, real-time OS kernels like VxWorks will be offered, and may run equally well on both i960RPs. For applications that do not need the processing power of the i960RP, but only twin DRAM memories, the processors may rest idle during normal operation. In any case, one i960 will be used to offer an embedded maintenance utility for diagnostics and configuration through the serial port.

### Twin high-speed DRAM Memories

Each of the two DRAM arrays of the MIDAS-220/250 boards is a high-speed memory that offers zero-wait-states within data bursts. Capacity can be from 2x16 to 2x64 MByte directly on the main board. Both DRAM banks are accessible from either of the two PCI busses, with single cycles and with DMA. This means that devices on VMEbus and RACEway may access the DRAMs directly as a regular slave memory.

To see Application Examples click [here](#).

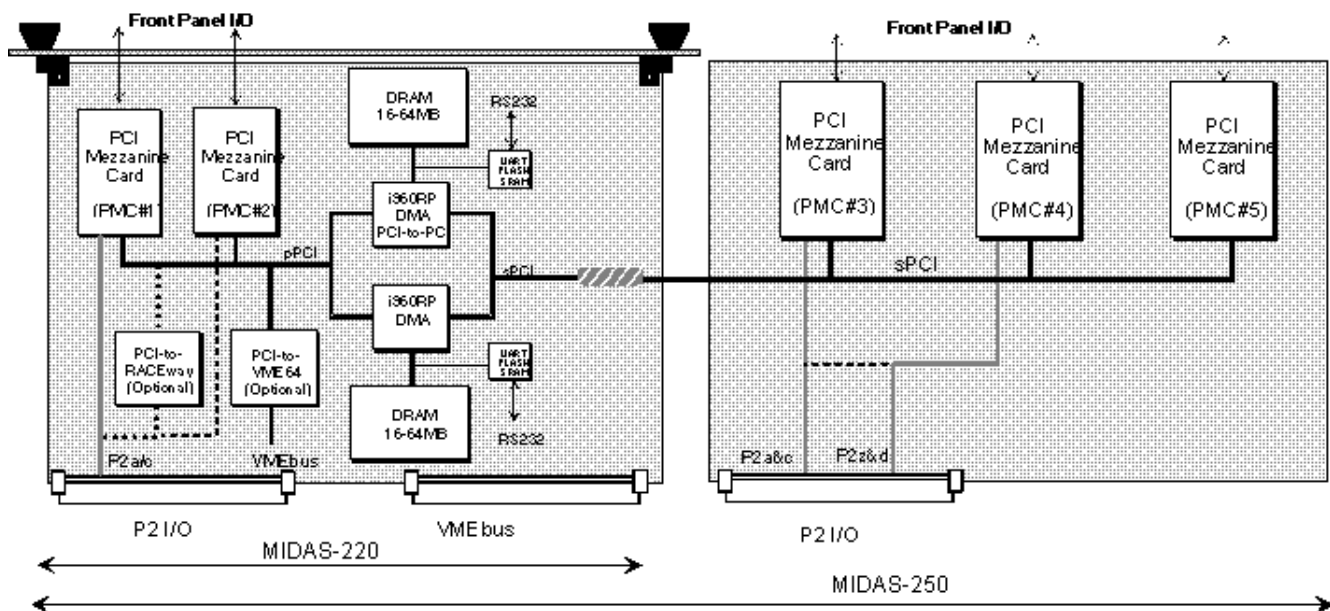


Figure 5. MIDAS-220 Standard PMC arrangement.

### MIDAS-220: Two PMC modules

The MIDAS-220 will accept two PMC modules within a single VME slot. In the standard version, the two modules are located on the same PCI segment, as shown in fig. 5.

## MIDAS-220S: Symmetrical PMCs

In order to take advantage of the PCI-to-PCI bridge to have one PMC on each side of the i960RPs, a symmetrical arrangement of two PMC modules is offered (-S option) see figure 6. In certain applications, this can be utilized to transfer data between the DRAM or i960 CPU and VME / RACEway concurrently with transferring data between PMC #2b and the DRAM or i960 CPU. A typical application would be a high-performance data acquisition system employing a “swinging buffer” (“flip-flop”) scheme for concurrent acquisition and readout by e.g. a DSP processor. (See also Application section below).

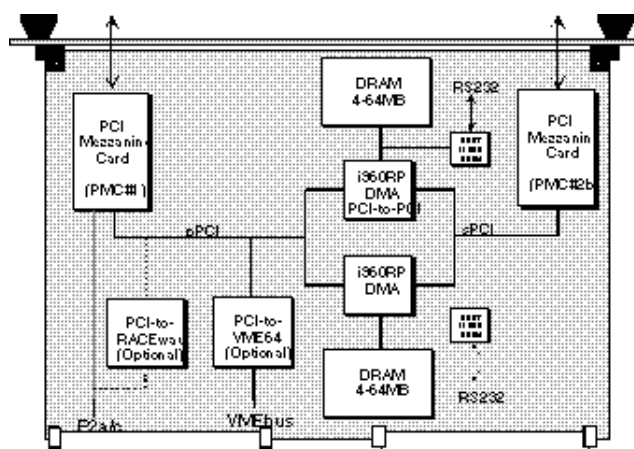


Figure 6. MIDAS-220S Symmetrical PMC arrangement.

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## MIDAS - General Features

### RACEway Crossbar Interface

All MIDAS boards may be offered with an interface to the RACEway high-performance crossbar interconnect. [RACEway](#) offers 160 MBytes/sec peak data rates between nodes, and multiple paths may simultaneously transfer data at this rate through the crossbar. The RACEway interface on the MIDAS boards is a bridge from PCI to RACEway on the P2 a/c rows, and offers 132 MBytes/sec peak performance and up to 100 MBytes/sec sustained. Normally, it will connect to a RACEway crossbar “interlink” module that plugs on as an overlay to the P2 connector on the VMEbus backplane. Such a module could offer connection to 4-16 other boards by means of active crossbar ASICs on the “interlink” overlay module. For communication with only one other board, the “interlink” can be a simple passive flat cable connection plus a clock oscillator. It is important to realize that RACEway is now standardized by [VITA](#) and ANSI as an enhancement of VMEbus. This means that the specifications are in the public domain, and several companies are offering RACEway compatible products today. Main applications are where multiple processors, I/O devices or memories need to exchange large amount of data in a deterministic, high-performance real-time system, like sonar, radar and imaging. (More information about RACEway can be obtained from the VITA office).

### Initialization

The board complies with AutoSlot-ID initialization, allowing jumper-less configuration. Alternatively, the base address of the Control/Status Register block can be set by jumpers. The PMC cards can be initialized from VMEbus or RACEway.

### PCI-to-VMEbus interface

The [PCI-to-VME interface](#) of the MIDAS boards offers full Master/Slave capability with decoupling FIFOs as well as a powerful DMA engine. This offers VMEbus data rates up to 70 MBytes/sec in VME64 mode, and PCI data rates at the theoretical maximum of 132 MBytes/sec. MIDAS is also capable of acting as a Slot-1 System Controller. Further, interrupts can be transferred between PMC modules and VME. In a pure RACEway-to-PMC application, the VME interface can be omitted to save cost.

### Front-panel or P2 I/O

The MIDAS boards support both front-panel or P2 I/O from the PMC modules. P2 I/O utilizes the optional P4 PMC connectors to direct I/O to the P2a/c VME connectors. The boards are also offered with the new 5-row DIN connector for additional I/O,

power and GND. On certain models, 32 pins of the P4 of two PMC sites are connected together, offering a direct intermodule communication path independent of the PCI bus. This also allows 32-pin P2 I/O from two PMC modules on the standard 3-row DIN.

To see Application Examples click [here](#).

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