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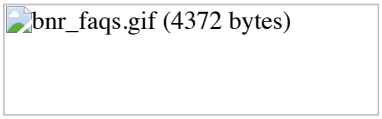
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CHAMP-AV Quad PowerPC

What is the IXA7 (Quad PowerPC)?

The IXA7 is a signal processing 6U VME basecard with two 64 bit wide PMC sites, featuring up to four Motorola MPC750 processors or four G4 processors incorporating AltiVec™ Technology, all designed within Ixthos' high performance CHAMP architecture. Additionally, the IXA7 features a MPC8240 PowerPC processor (known as the IOPlus) that contains both the MPC603e core and a PCI interface/memory controller, handling I/O control and board management issues. For more details please refer to the IXA7 data sheet.

What is the CHAMP architecture?

Common Heterogeneous Architecture for Multi-Processing (CHAMP) is a high performance architecture that organizes the board processing resources into three groups, two Signal Processing Elements (SPE) and one Core Processing Element (CPE). With the use of PCI-PCI bridges, the PCI bus within each group/element is isolated from the PCI buses of the remaining groups, thus allowing concurrent data movement within each group with maximum performance. A PMC module is dedicated to each SPE.

What are the key features of the IXA7 CHAMP architecture?

- I/O provided through two industry standard PMC sites. External interface through the front panel, P2 and P0 connectors.
- Isolated sections of the PCI bus facilitate concurrent data movement on each section. Each section is capable of executing up to 66MHz/32bits. This provides each cluster processor with a high speed (264Mbytes/sec theoretical) and deterministic data path from its dedicated PMC site.
- IOPlus processor provides multiple software operational modes. On power up, the IOPlus processor may be loaded with code that allows it to service specific I/O requests from the other signal processors on the board, therefore offloading I/O tasks from these units. The user may also write an application for the IOPlus which, when linked with the appropriate runtime library (the IOPlus API), will maintain this capability. This I/O capability is not required and may be omitted at compile time.
- VxWorks can be run on any of the PowerPC processors, including the IOPlus. If the IOPlus processor is booted with VxWorks, the IOPlus can still be used to service I/O requests as described above.
- Each PowerPC processor has an individual Ethernet address. This, for example, will allow multiple debug windows to be opened concurrently under VxWorks.
- Provides a good balance of global and local memory.

Does Ixthos provide any other VME baseboards that utilize this same CHAMP architecture?

Yes, Ixthos does offer a C6 based (TI) DSP baseboard that maintains the same high performance CHAMP architecture.

How much processing power is provided by the IXA7?

The IXA7 provides:

- Up to 14.4GFLOPS when populated with four 450MHz MPC7400 (AltiVec™) processors
- Up to 12.8GFLOPS when populated with four 400MHz MPC7400 (AltiVec™) processors
- Up to 3.7GFLOPS when populated with four 450MHz MPC750s

What distinguishes the IXA from other PowerPC/DSP VME cards?

- The IXA provides both commercial and rugged solutions.
- CHAMP architecture positions the IXA7 as a DSP engine, as opposed to an array processor due to the high speed and deterministic data movement. Further, the 7400 processor provides a vector processing unit, which allows for the processing of multiple data elements in a single instruction.
- Robust software offering that supports the popular industry standards (VxWorks-MP and VSIPL) implemented in an efficient manner to optimize performance
- Channel-1 support (PMC based) provides a rugged multi-processing model

What kind of I/O does the IXA7 provide?

I/O is provided through two industry standard PMC sites, allowing for utilization of off the shelf PMCs to meet a variety of application needs. Each PMC site includes external interfaces through the front panel and VME P2 and P0 connectors.

How many processors can be populated on the IXA?

Up to four Motorola MPC750s or G4 PowerPCs (two per cluster) and one MPC8240 PowerPC I/O Controller (the IOPlus).

Can I order an IXA7 with less than four cluster PowerPCs?

Please contact Ixthos for ordering options.

What cluster processor PowerPCs are available on the IXA7?

Two PowerPC flavors are available:

1. MPC750 or MPC755 running at 300-400 MHz (future speed increases planned)
2. G4 PowerPC incorporating AltiVec™ Technology running at 300-400 MHz. (future speed increases planned).

Will the IXA7 support future upgrades of the Motorola processors?

There are plans to support the future revisions of the Motorola processors. Contact Ixthos for further information.

What kind of memory is provided on the IXA7?

Both global and local processor memory options are provided. Additionally, each cluster processor maintains its own L2 cache.

How much global memory is available?

32 MBytes or 64 Mbytes of SDRAM accessible from either the PCI bus or the IOPlus.

How fast does the global SDRAM interface run?

100 MHz.

How much local memory is available?

64 MBytes or 128 Mbytes of SDRAM, accessible from the PCI Bus or the local cluster PowerPCs.

How fast can the local cluster memory (SDRAM) be accessed?

100MHz.

What L2 cache sizes are supported?

1 MB of cache memory is supported for the MPC750/755 while 1 or 2 MB is supported for the MPC7400.

How fast can the DSP L2 Cache be accessed?

The speed of the Cache bus depends upon the core frequency of the PowerPC processor. For the MPC750, the maximum theoretical speed is 150 MHz while for the MPC7400, the maximum theoretical speed is 200 MHz.

How much non-volatile memory (FLASH) is available?

Up to 16Mbytes.

Does the IXA7 support 66 MHz/64bit PMCs?

Yes, it also supports 33 MHz/32 bit and 66 MHz/32 bit PMCs. However, the PCI interface in each SPE will support 66 MHz/32 bit only. A 66 MHz/64 bit bus is provided to/from the PMC's for future expansion.

Is a rugged version of the IXA7 available?

A rugged version of the IXA7 is planned. Please contact Ixthos for more information.

Does the IXA support DMAs?

Yes, the IXA board supports DMA operations. Both the MPC107's and the IOPlus contain DMA engines. Software is provided so that the user can control these engines without concern for the details of their operation. For instance, the IOPlus provides a software capability known as SmartDMA. Further, the board support library provides DMA functions specific to the MPC107's. DMA transfers allow the following data movements:

- PCI to Global SDRAM and Global SDRAM to PCI
- SDRAM to SDRAM (local or global)
- PCI to PCI
- PCI to VME and VME to PCI

What is the MPC107?

The MPC107 is a memory/processor/PCI interface that connects the PowerPCs, local memory, and PCI bus together in each Signal Processing Element. The MPC107, through the PCI interface, provides connection to a PMC site and the Core Processing Element.

What are SmartDMAs?

An IXA-capability that allows a user to send and queue commands from one processor to another. Such "commands" include (but are not limited to) generating interrupts, moving data, resetting various board devices and performing VMEbus RMW cycles.

Does the PCI Bus support 3.3v signaling PMCs?

Yes (the PMC sites are keyed).

Does the PCI Bus support 5V PMC signaling?

No.

Does the IXA7 board require a five row VME chassis?

Yes, the IXA7 board must be provided both 3.3 and 5 volts. This is accomplished with a 5 row chassis.

What areas on the IXA are accessible from the VMEbus?

Areas accessible from the VMEbus include global memory, the PMC sites, (SPE) local memories (excluding the L2 cache) and certain control registers.

Does the VME interface support VME64x?

Yes, the IXA supports full VME64x master/slave implementation.

How is the VME base address of the IXA setup?

The IXA supports several base address configuration methods:

- Auto ID capability from the VME interface
- Geographical Address pins (These provide a slot ID for the board. Based on the slot ID, an address is selected from a lookup table.)
- Fixed default address specified in boot code.
- Board Jumpers

Does the IXA support Ethernet?

Yes, the IXA supports Ethernet connectivity. Each processor on the IXA7 board has an individual Ethernet address.

Does the IXA support RS232?

Yes, the IXA supports RS232 connectivity.

What functions can the IOPlus (MPC8240) serve?

- The IOPlus (MPC8240) is the PCI Bus master.
- It configures and tests the board at power-up.
- It boots the SPE processors.
- It provides board control (i.e. processor reset, etc.) and I/O capability.

What interrupts are available on the IXA7 board?

- VME interrupts
- PCI interrupts
- Processor to processor interrupts
- DMA interrupts
- Timer interrupts
- User defined interrupts

Are there any status LEDs on the IXA?

Yes, the IXA has a user programmable LED for each SPE processor and the IOPlus.

Is JTAG supported on the IXA?

Yes, the IXA has two user JTAG chains. These chains are available on the P0 connector via a transition module. The two available chains are listed below:

1. JTAG for IOPlus.
2. Common JTAG connector for the SPE PowerPC's. All on board cluster PowerPC nodes are connected over a common JTAG chain.

What kind of backplane do I need for the IXA7?

A standard 6U Eurocard 5-row back plane with a connected power supply that provides 5V, 3.3V and +/-12V is required (VME64x). If a chassis that supports the VME64x standard is not available, contact Ixthos technical support for other options. The estimated power requirements for the IXA7 is 3.3V @ 24 Watts and 5 V @ 35 Watts.

Does the IXA have any protection against improper voltage levels at power up if the card gets plugged into either a chassis with a bad power supply or the wrong chassis all together?

Yes, the IXA board does have voltage protection circuitry to guard against abnormal under-voltage conditions or undetected voltage levels on the voltage supply lines.

What application development environment is provided for the IXA7?

- A Tornado development environment via Ethernet/RS232 connectivity. Each processor is assigned a unique ethernet address, allowing the user to access each processor simultaneously (through multiple Tornado windows). A VxWorks kernel may be run on the IOPlus and/or on each SPE processor.
- Other RTOS environments, such as LynxOS may be supported in the future.
- A JTAG emulator may also be used for development.
- Development utilities are also available over the VMEbus.

What kind of software will be provided to develop applications for the IXA7?

A Board Resource Library (BSL) will be available, providing capabilities such as:

- VME interface routines
- PCI Bus functions
- PCI/PowerPC/SDRAM bridge library routines
- SmartDMA functions
- Interrupt Mux support code
- Reset functions.

Also a host library support package will be provided, enabling:

- Downloading code to any or all processors
- Code startup
- FLASH

What host platforms will be supported by the host board support package provided for the IXA7?

The host library support package will function under several host platforms, including current DY4 SBCs and BIT3/PCI. Please contact Ixthos to determine whether or not the current IXA7 host library supports a specific host platform. In addition, the host code will be delivered as source for customers to port to additional hosts that are currently not supported. Please contact Ixthos for further information on obtaining a Host Port Kit.

Does the IXA7 have any power-on self tests (POST)?

Yes, the IXA7 does include a Power On Self Test.

Are any peripheral/interconnect support options provided?

Yes, the IXA7 has two PMC sites that provide integration of a vast array of commercial off the shelf PMCs which support multiple interconnect options, such as Raceway, Myrinet and Channel One. Specifically, the DY4 PMC642 fiberchannel board is compatible with the IXA7. Further, the VI Protocol is supported. Please contact Ixthos for more information regarding supported interconnect offerings.

Does the IXA7 support Message Passing Interface (MPI)?

Yes. MPI support is considered to be an important part of our software offering. However, it is important to note that as this is most crucial for multi-board applications, it must be based on some interconnect fabric. The two fabrics for MPI support currently offered are: VME and DY4's PMC642. Other interconnect fabrics implemented with off the shelf PMCs will have no clear path for MPI support. Please contact Ixthos for more information on supporting MPI on additional fabrics.

Is there any third party Integration/Support with the IXA7?

Yes, the following third party software products are currently targeted for integration/support with the IXA7:

- VxWorks from WindRiver

For additional third party offerings please contact Ixthos.

How much power is dissipated by the IXA7?

Typical max power draw on:

3.3V = 24W
5.0V = 35W

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