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GE Fanuc
Embedded Systems



NEXUS™ Quattro

PowerPC® VME Multiprocessor

Features

- Four PPC 7448 or 7447A CPUs
- Two independent local PCI-X Buses, 64 bit/133 MHz
- Two industry standard PMC Sites (IEEE P1386 compliant)
- 1 GB or 2 GB DDR 266 SDRAM with ECC
- 256 MB of user and 64 MB of boot flash
- Onboard Gigabit Ethernet (10/100/1000)
- ANSI/VITA 31.1 switched network
- ANSI/VITA 1.5-2003 (2eSST, VME320)
- Serial ports with front and rear access
- Rugged or commercial environments per ANSI/VITA 47-2005
- WingSpan™ Software Development Suite support including:
  - VxWorks and Linux BSP and Library Support
  - AltiVec™ optimized VSIPL & Vector Library Functions

The NEXUS Quattro Multiprocessor from GE Fanuc Embedded Systems features the latest Freescale™ PowerPCs in a distributed memory multiprocessor architecture to achieve the highest performance for the most demanding signal, image and real-time processing applications.

Applications

- RADAR, IR and IMAGE processing
- SIGINT, ELINT, ESM
- Sonar and acoustic signal processing
- High-speed I/O controller
- Simulators
- High performance computing

Integrated Backplane Communications

High performance systems require that inter-processor communications be available as an integral part of the hardware and software solution. In support of recent developments in VITA standards activities, the NEXUS Quattro has built-in backplane interconnectivity using open communications standards. Initial product release of the NEXUS Quattro includes Gigabit Ethernet over the backplane per VITA 31.1 with the supporting backplane and switch card available separately. Configurations that support VITA 41.3 are expected to be available soon.

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NEXUS™ Quattro PowerPC® VME Multiprocessor

Hardware

The NEXUS Quattro is a quad CPU distributed memory multiprocessor featuring Freescale™ 7447A CPUs at 1.167 GHz or 7448 CPUs running at up to 1.267 GHz and the latest Marvell Discovery III bridge. The high performance data transfer mechanism facilitated by the built-in 64-bit full duplex crossbar in the Discovery III permits concurrent data transfers between different interfaces as well as transaction pipelining for same source and destination transactions. A programmable arbiter is set up to handle resource conflicts and to guarantee minimum latency. Communication between onboard processing nodes is available using multiple methods including Gigabit Ethernet and through the bridge using the PCI-X buses to provide a bisection bandwidth of over 2 GB/s.

Integrated hardware provides a wide range of user accessible functions including:

- Sixteen independent DMA controllers (4 per node)
- Four interrupt controllers (1 per node)
- Sixteen general purpose 32-bit timer/counters (4 per node)
- Four Watchdog Timers (1 per node)
- 256 MB of user flash with FFS support (first processor only)
- 64 MB of boot flash (16 MB per node)
- One real-time clock
- Four temperature sensors (1 per processor)
- Eight serial ports (2 per node - one to front panel and one to rear IO)

High Performance System I/O

Users are provided an onboard selection of standard I/O solutions including Gigabit Ethernet connections, dual PCI-X busses running at 133 MHz, and two serial ports. Also, two industry standard (IEEE P1386) 64-bit/133MHz PCI-X PMC sites are available to provide a wide range of additional system interfaces and expanded functionality including FPGAs and switched fabric interconnects. User I/O for these PMC sites is VITA 35 compliant via the P2 connector. The increased VME performance of the 2eSST PCI-X-to-VME bridge (Tempe™) from Tundra is standard on the NEXUS Quattro, adding an immediate performance boost (up to 320 MB/s) for existing VME64X backplanes while maintaining compatibility with legacy VME products.

VME Support

VME master

- A16, A24, A32, A64 address cycles
- D8, D16, D32 SCT & BLT data transfers
- D64 MBLT, 2eVME, 2eSST SST320 data transfers
- RETRY & RMW

VME slave

- A16, A24, A32, A64 address cycles
- D8, D16, D32 SCT & BLT data transfers
- D64 MBLT, 2eVME, 2eSST SST320 data transfers

Interrupt bus

- I(1-7) interrupter & IH(1-7) interrupt handler System controller
- SysCon function & PRI, RRS, SGL arbitration modes

Other

- 64-bit 133 MHz PCI-X bus interface
- Integral FIFOs buffer multiple transactions in both directions
- Two programmable DMA controllers with linked-list support
- Eight programmable slave images on VME bus and PCI-X bus ports

GPIO Support

GPIO flexibility is provided on the NEXUS Quattro using the I^2C bus and a user defined/developed transition module to create GPIO signals based on user requirements. An optional standard transition module is available from GE Fanuc Embedded Systems for rear panel access to a selection of GPIO signals, serial ports and PMC user I/O access.

Commercial and Rugged Versions

The Quattro is designed and tested to support commercial (forced air) and rugged (forced air or conduction-cooled) applications using the same functional design. This permits the application to be developed using cost-effective lab environment products, while delivered systems incorporate the required environment support, thus minimizing application software changes between lab and the deployed target platform.

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Software Support

Board support packages (BSPs) for VxWorks®/ Tornado and Linux® operating systems are available for the NEXUS Quattro. These BSPs are based on existing versions for our NEXUS I and other multiprocessor products giving your application a proven baseline of operating system functions and utilities including Built-In-Test (BIT), Power On Self Test (POST), and user configuration. The POST and BIT utilities can be configured by the user for specific application needs and BIT functions are available as individual calls under the RTOS BSP to support application, system, and background tests. A boot monitor provides low level board utilities essential to initial board setup during application development, including user flash management. Multi-board communications are facilitated through operating system resources such as VxMP or BSP-level features.

VxWorks or Linux OS support is standard for the NEXUS family and is built upon proven high performance software provided by the integrated WingSpan™ development suite from GE Fanuc Embedded Systems. This development suite is available for NEXUS Quattro as well as all GE Fanuc Embedded Systems PowerPC multiprocessor products. It provides seamless development and run-time solutions for application configurations whether one or all of the high performance processing hardware platforms are being used.

Development of advanced signal processing applications is greatly simplified using the tools available under WingSpan including a user friendly API to speed software development for the NEXUS Quattro platform. Application performance is enhanced through the use of the Altivec optimized signal processing libraries with both VSIPL and "C" APIs included in WingSpan. The total number of functions is over 3000.

Maintenance & Support

For details on software support as well as ordering configuration information contact your local GE Fanuc Embedded Systems sales representative.

Extreme Environmental Performance

	Class EAC1 Commercial	Class EAC2 Extended Temperature	Class EAC6 Rugged Forced Air	Class ECC3 Rugged Conduction Cooled
Operating Temperature	0° C to +55° C w/300 LFM airflow	-40° C to +55° C w/300 LFM airflow	-40° C to +70° C w/600 LFM airflow	-40° C to +70° C Thermal interface
Storage Temperature	-40° C to +85° C	-40° C to +85° C	-50° C to +100° C	-50° C to +100° C
Operating Humidity	95% noncondensing	95% noncondensing	95% noncondensing	95% noncondensing
Random Vibration	5 to 100 Hz @ PSD = 0.04 g^2/Hz	5 to 100 Hz @ PSD = 0.04 g^2/Hz	100 to 1000 Hz @ PSD = 0.04 g^2/Hz	100 to 1000 Hz @ PSD = 0.1 g^2/Hz
Shock	20 g sawtooth 11 ms duration	20 g sawtooth 11 ms duration	20 g sawtooth 11 ms duration	40 g sawtooth 11 ms duration
Conformal Coating	Optional	Optional	Optional	Yes

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NEXUS™ Quattro PowerPC® VME Multiprocessor

Specifications

Weight
- 28 oz (794 grams) estimate

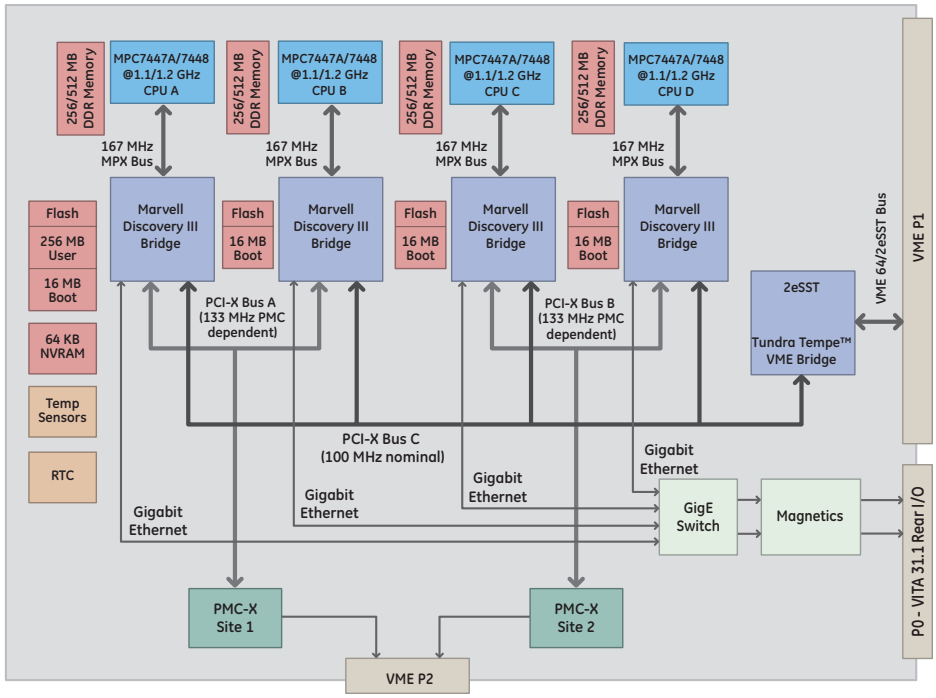
Power Consumption
- 75 watts (typical) estimate

Operating Temperatures
- 0 °C to 55 °C - CLASS EAC1
- -40 °C to 55 °C - CLASS EAC2
- -40 °C to 70 °C - CLASS EAC6
- -40 °C to 70 °C - CLASS ECC3

Storage Temperatures
- -40 °C to 85 °C - CLASS EAC1/2
- -50 °C to 100 °C - CLASS EAC6/ECC3

Relative Humidity
- 10% to 95% non-condensing - CLASS EAC1/2
- Up to 95% non-condensing - CLASS EAC6/ECC3

Block Diagram



Ordering Information

NEXUS Quattro-4-PROC-CLK-MEM-P0-ENV

PROC = PowerPC Processor: 7447A; 7448
CLK = CPU Clock: 1.1 GHz (7447A); 1.2 GHz (7448)
MEM = SDRAM: 1 GB; 2 GB
P0 = P0 I/O Type: V31 (VITA 31.1)
ENV = Environmental: EAC1; EAC2; EAC6; ECC3

About GE Fanuc Embedded Systems

GE Fanuc Embedded Systems is a leading global provider of embedded computing solutions for a wide range of industries and applications. Our comprehensive product offering includes many types of I/O, single board computers, high performance signal processors, fully integrated, rugged systems including flat panel displays, plus high speed networking and communications products. The company is headquartered in the U.S. and has design, manufacturing and support offices throughout the world. Whether you're looking for one of our standard products or a fully custom solution, GE Fanuc Embedded Systems has the breadth, experience and 24/7 support to deliver what you need. For more information, visit www.gefanucembedded.com.

GE Fanuc Embedded Systems Information Centers

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Asia Pacific:
86 10 6561 1561

Europe, Middle East and Africa:
+49 821 5034-0

Additional Resources

For more information, please visit the GE Fanuc Embedded Systems web site at:

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