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Find the *GE Fanuc / DNA Computing Solutions VQG4* at our website: ***Click HERE***

GE Fanuc Automation



VQG4™

Quad PowerPC® G4/Altivec

The VQG4 from GE Fanuc Embedded Systems is a high-performance quad G3 (MPC750) or G4 (MPC7410) PowerPC (PPC) VMEbus Single Board Computer (SBC) designed to support high-end multi-processing applications. The board's architecture strikes a balance between four processors sharing global memory and I/O resources and four individual processors, each with its own dedicated memory resources. The VQG4, which provides four processors that can operate independently or cooperatively, was specifically designed for embedded applications. With its vast array of interfaces (VME, Ethernet, PMC, serial ports, PCI-P0), the VQG4 allows users to perform intensive I/O while permitting rigorous computing. Two industry standard PMC sites enhance the I/O capability of the board, allowing users to provide program specific features by using commercially available PMC modules. The boards are completely open standards based, from the RTOS to the G4 optimized VSIPL (Vector Signal Image Processing Library), to ease technology insertion. Other embedded features include a 32 MB User Flash pool and up to 512 MB of embedded memory.

Features

- Single, dual, or quad PPC 750/7410 configurations
- 64 bit, 100 MHz PowerPC local buses
- Two independent local PCI buses, 32 bit/33 MHz, 64 bit/66 MHz
- Two industry standard PMC sites
- 2 MB L2 backside cache per PPC G4
- Up to 512 MB SDRAM with ECC
- 32 MB user flash and 2 MB boot flash
- Fast Ethernet (10/100)
- Four RS232/RS422 UART serial ports with front or optional rear access
- VxWorks and Linux BSP and library support
- G4 optimized VSIPL and Vector (2200+) library functions
- RACE++ PMC support
- PCI-Pzero™ overlay provides a high speed PCI bus for PMC expansion
- WingSpan™ Software Development Suite support for rapid development of signal and image processing applications and mathematical processing algorithms

PCI-Pzero

GE Fanuc Embedded Systems' PCI-Pzero overlay provides an economical way to expand PMC capacity by interconnecting the onboard 64 bit/66 MHz PCI bus between as many as four boards. The board overlay fits on the backside of the VME backplane and forms an interconnect between board configurations.

The PCI-Pzero overlay is based on PCI 2.2 specifications. The complete solution incorporates a PMC module with a bridge chip that connects to the PCI 64 bit/66 MHz bus, and a PMC carrier test board. The PMC carrier/test board allows developers to monitor the PCI bus overlay by providing a Mictor connector to attach a signal analyzer. This same board provides two 64 bit PMC sites allowing two PMC cards to be added to the PCI-P0 board cluster. This secondary PCI databus provides full interrupt support and high speed data transfers. PCI initialization and DMA transfers are supported by the VxWorks and Linux BSPs.

Processor Core Memory

All processor external memory is located on-board and consists of SDRAM w/ ECC, 1 or 2 MB of private L2 cache per PPC, boot flash memory and a large user flash pool for the processor group. The CPC710 PCI bridge/memory controller provides high-performance memory control that includes a DMA controller, up to 100 MHz SDRAM interface, and 2 MB Flash I/O.

Board I/O

The processor group's local bus is bridged to two independent PCI buses. This allows slower I/O devices to be isolated on the 32 bit, 33 MHz PCI bus along with a PMC site. A second PMC site is provided on the faster 64 bit/ 66 MHz PCI bus. The 32-bit PCI bus is bridged to Fast Ethernet, VME, and RS232 control to support network and peripheral connections. A total of four RS232 UART interfaces are provided via the front panel, or optionally, VME P2. The rear routing option allows a choice between RS232 or RS422. The PMC module sites provide flexible industry standard I/O expansion for custom or COTS modules.

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P2 Routing Options

Both PMC sites support user-defined connectivity to the VME P0 or P2 connectors. This allows the user to design and utilize custom I/O modules in a PMC form factor. The VQG4 offers a broad range of PMC User I/O routing options using a factory-configurable hardware design. These configurations may be modifications of the standard routing options as defined by current VQG4 builds. These include a Dual PMC P2 version where PMC user I/O are routed to the P2 connector, RACE++ signal routing, and PCI over P0. With this extreme level of I/O flexibility, the VQG4 can easily provide an I/O option to meet your system needs.

VME64 Master/Slave Interface

The VQG4 provides a full-featured VME64 master/slave interface that supports D32 and D64 block transfers as both master and slave. The VME interface additionally provides system controller capability and can act as a VME interrupt generator and handler.

PMC Expansion Sites

The processor group's local bus interfaces to both the 64 bit, 66 MHz and 32 bit, 33 MHz PCI bus. The PMC sites, compliant with IEEE P1386, are single-width (75 x 155 mm) providing access to front panel and VME P2 and P0 I/O resources. Using PMC modules, the VQG4 has access to a myriad of module options. These COTS module options include RACE++, Fibre Channel, Front Panel Data Port (FPDP), MIL-STD-1553, video, and others.

GPIO Support

GPIO signals are supported on the VQG4 through the P2 or P0 connector for selected routing options. Up to 12 signals in groups of 6 each are supported. LVTTL signaling is available which may be buffered on a user transition module to supply other signaling requirements. Contact GE Fanuc Sales for more information.

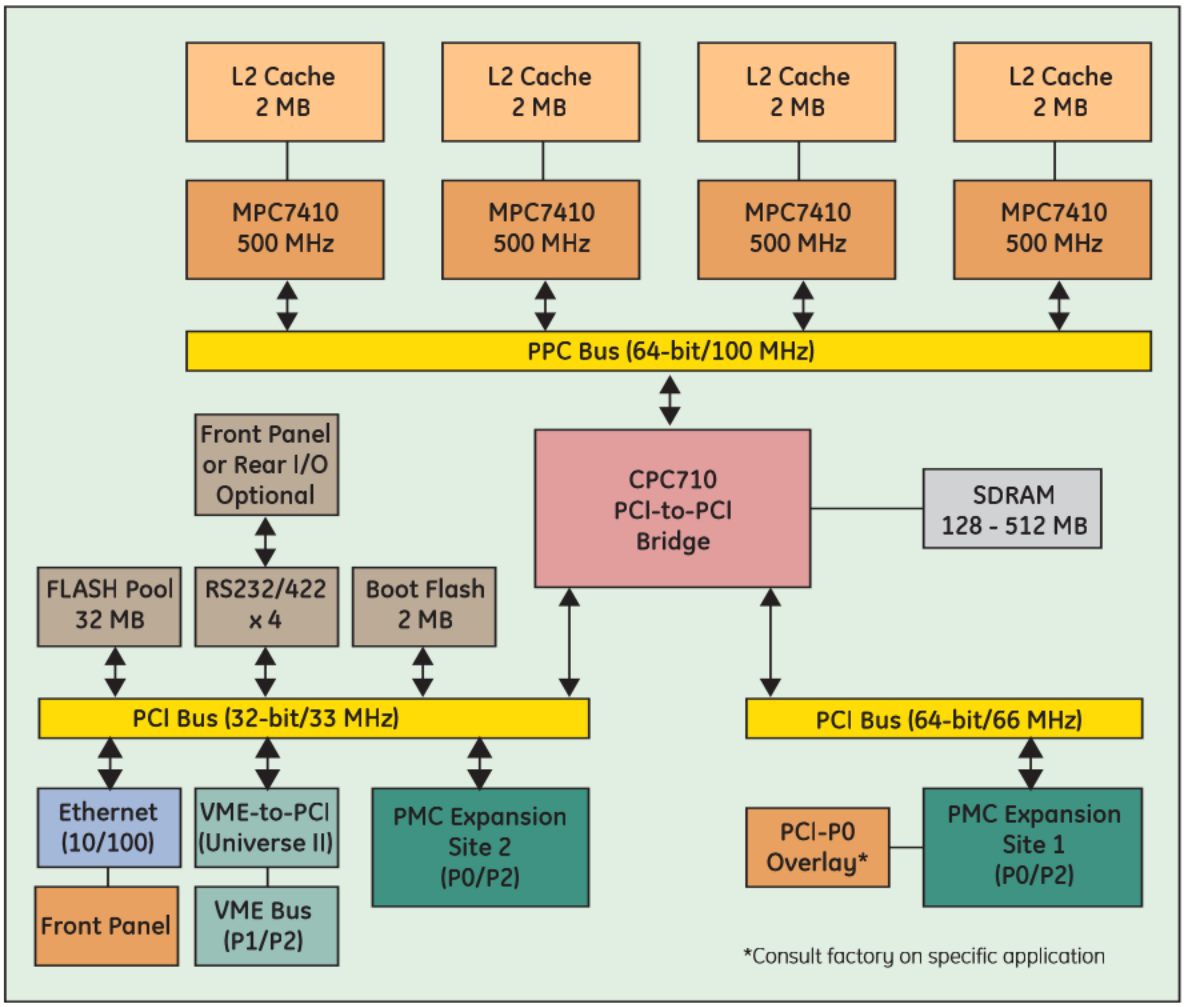
Fast Ethernet Interface

The VQG4 supports an integrated Fast Ethernet controller providing an on-board auto-sensing IEEE 802.3 10/100 Mb/s Ethernet interface. This device functions as a full 32-bit PCI DMA. It has separate transmit and receive DMA channels and on-chip FIFOs to support full duplex operation. The Ethernet interface is available through a front panel RS45 connector.

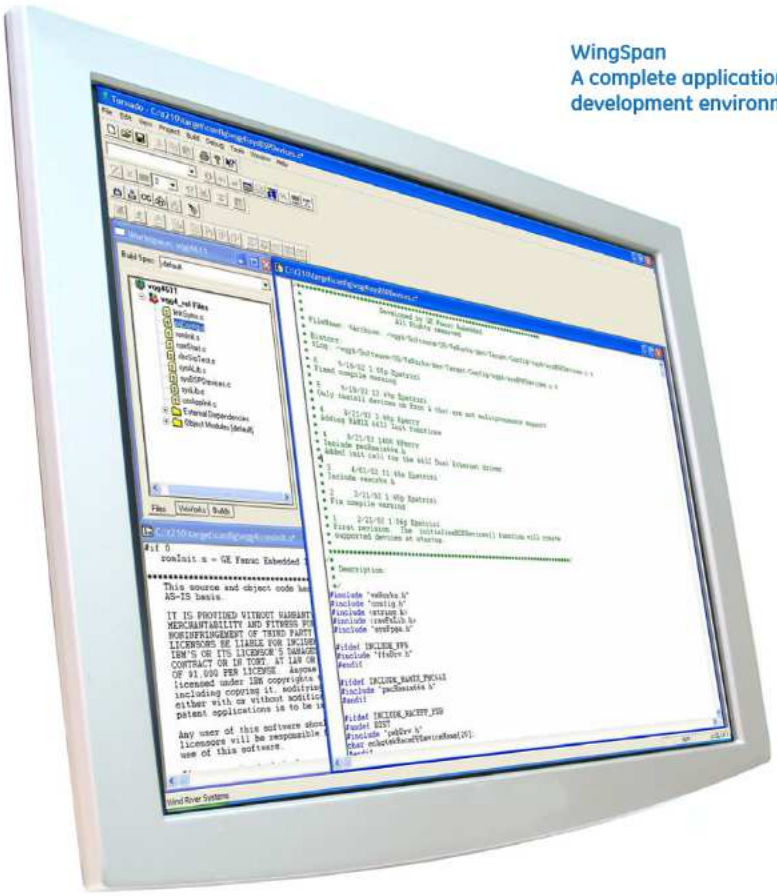
Flash Pool

A separate 32 MB on-board Flash Pool is provided in addition to the 2 MB Boot Flash. The 32 MB Flash Pool provides large a non-volatile resource for embedded applications.

VQG4 Block Diagram



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WingSpan
A complete applications software development environment

VSIPL Libraries

GE Fanuc's robust VSIPL Library targets PowerPC microprocessors, and has been optimized for the G4 and its high-speed backside L2 cache. VSIPL enhances application portability between platforms by providing a consistent API and a common set of mathematical functions for all supporting platforms. The Library speeds development and eases new technology insertion by eliminating the need to re-code function calls.

Software Support

The VQG4 firmware supports board initialization, power up tests and the operating system boot process. The VQG4 board architecture supports a wide range of industry standard operating systems including real-time kernels and multi-processor extensions. These operating systems include VxWorks/Tornado from WindRiver and Yellow Dog Linux for SMP PowerPC applications.

Self Test and BIT Monitor (BMON)

Power-On Self Test (POST) and commanded Built-in-Test (BIT) capabilities are included with the GE Fanuc BSP. Both VxWorks and Linux BSPs use a series of test libraries and can be configured to execute some or all of the library routines. Each BIT library function is available as an individual call allowing for integration into system level tests. Also, a bit monitor function (BMON) is provided via console serial port. It provides the ability to program Boot and User flash, modify and display memory, modify and display BIT test options, and manually run BIT from a command line.

WingSpan

The VQG4 is supported by the WingSpan™ Development Suite from GE Fanuc Embedded Systems. WingSpan provides a complete software development toolset for all supported operating systems including compilers, debuggers and Altivec-optimized math libraries with various APIs. WingSpan is designed to support your application throughout its life cycle from Migration to Development, Deployment, and Maintenance.

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About GE Fanuc

GE Fanuc Embedded Systems is a leading global provider of embedded computing solutions for a wide range of industries and applications. Featuring a comprehensive offering that includes Intel- and PowerPC-based SBCs and complete I/O systems, industry-leading communications technology, industrial, rugged flat panel monitors and computers and more, GE Fanuc Embedded Systems can support your full range of embedded computing needs. Whether you require a standard product or a fully customized solution, GE Fanuc Embedded Systems can provide the breadth, experience and 24/7 support to make you successful. For more information, visit www.gefanuc.com/embedded or call 1-800-GE Fanuc.

VQG4 Specifications

Weight

- 14.5 oz

Power Consumption

- 40 watts (5 V) (typical)

Operating Temperatures

- 0 °C to +50 °C (Commercial)
- -20 °C to +65 °C (Extended temperature)

Storage Temperatures

- -40 °C to +80 °C

Relative Humidity

- 10% to 90% non-condensing

VQG4 Ordering Options

VQG4-OS-A-PROC-MMM-R-SER-R0-C	
OS	**= Operating System**
	VxWorks
	Linux
A	**= 500 MHz processors**
	1
	2
	4
PROC	**= PowerPC or G4**
	750 = PPC750
	G4 = MPC7410 AltiVec™
MMM	**= SDRAM**
	128 MB
	256 MB
	512 MB
R	**= RACE++ Routing to P2**
	R = Yes
	N = No
SER	**= P2 Serial Access**
	422
	232
R0	**= Multiple P2 Routing Options**
C	**= Optional Conformal Coating**

GE Fanuc Embedded Systems Information Centers

Americas:
1 800 322 3616 or 1 256 880 0444

Asia Pacific:
86 10 6561 1561

Europe, Middle East and Africa:
33 1 4324 6007

Additional Resources

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

www.gefanuc.com/embedded

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Embedded Systems

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