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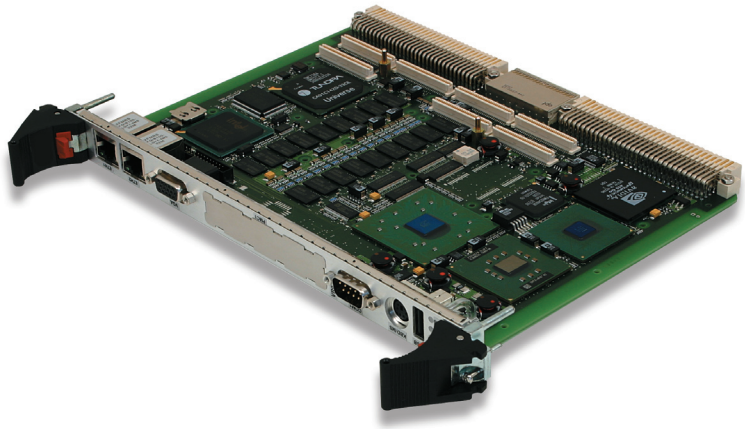
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GE
Intelligent Platforms



VR9

High-performance, Rugged 6U VMEbus Embedded Computer

Features

- Intel® Pentium® M processor, 600 MHz to 1.6 GHz
- Ultra compact, 1 slot only or 2 slot with front panel I/O
- Compliant to IEEE Std. 1101.2-1992 & ANSI/VITA 20-2001
- Extensive Software Support
- Up to 2GB DDR SDRAM (200) with ECC
- Flash Drive up to 1 GB or local 2.5" hard disk
- VGA/LCD up to 2048 x 1536, 16/32 MB DDR SDRAM
- Two Gigabit Ethernet ports10/100/1000 BaseT front or rear optional
- Compliant to VITA 31.1-2003
- Two PMC extension slots, one 64-bit/66 MHz and one 32-bit/33 MHz
- Ultra ATA/100 onboard, second channel mixed with PMC32/33 rear I/O
- 2x serial I/O with FIFOs RS-232/422/485 interface
- USB 2.0 ports one front, 2 rear
- Watchdog, temperature sensor
- Optional –40°/+65°C
- Conduction cooling
- High shock and vibration immunity with stiffener bars and wedge locks
- Conformal coating
- Custom specific, low cost assembly versions
- RoHS compliant with version 3.x

The VR9 is a 6U VMEbus all-in-one CPU board with integrated low power gigahertz processor speed and dual Gigabit Ethernet channels compliant to VITA 31.1-2003.
The VR9 is designed to meet the needs of embedded application developers addressing markets like industrial automation, medical, scientific, imaging, telecommunication, military and aerospace.

Based on the Intel Pentium M processor (0.13 chip technology), the VR9 platform is designed to support processors starting with 600 MHz up to 1.6 GHz. It offers low power consumption and eliminates the need for on-board ventilation.

The VR9 provides a unique feature set, including up to 2 GB DDR SDRAM (200) with ECC, three independent on-board PCI buses, support for the VME64x backplane, two PMC interfaces (64-bit/66 MHz and 32-bit/33 MHz). High level of functional integration (VGA/TFT, Gigabit Ethernet, serial interfaces, etc.) within a single slot gives users the freedom to use the PMC interfaces as extensions for their applications. This combined with a custom specific assembly service provides optimized price/performance for all kinds of OEM applications.

Versions with front panel I/O are available in various configurations with and without PMC support. Rugged needs are addressed with optional conduction cooling and extended temperature range of up to -40° to +65° C, increased shock and vibration immunity using stiffener bars and wedge locks, and conformal coating. The conduction cooled VR9 is compliant to the specifications IEEE Std. 1101.2-1992 and ANSI/VITA 20-2001.

Special features include two serial channels with flexible RS-232 or RS-422/485 interfacing and LCD controller. Supported operating systems are Microsoft® Windows® 2000, Microsoft Windows XP, QNX, VxWorks®, LynxOS®, Linux® and others.

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VR9 High-performance, Rugged 6U VMEbus Embedded Computer

Specifications

VME64 - Tundra Universe IID
- Industry standard CA91C142D PCI to VMEbus controller
- Full VMEbus system controller
- FIFOs for write posting, DMA controller with linked list support
- Master/slave transfer modes: BLT, ADOH, RMW, LOCK, RETRY
- A32/A24/A16 and D64(MBLT)/D32/D16/D8
- Geographical Addressing

Processor - µFCBGA, Low Power Design
- Scalable processing power with flexible processor design
- Intel Pentium M processor: 1.4 GHz to 1.8 GHz
- Intel Celeron M processor: 1.0 GHz to 1.3 GHz
- High efficiency on-board switching regulator (DC/DC)
- Fanless cooling with heatsink
- Contact factory for latest CPU versions

Chipset – Intel E7501/P64H2/ICH4
- 400 MHz system bus to processor
- PCI burst mode transfers up to 512 MB/s (64-bit/66 MHz)
- Two 64-bit wide PCI buses with 66 MHz
- One 32-bit wide PCI bus with 33 MHz

Cache	Level 1	Level 2
Pentium M (90 nm)	32 KB	2048 KB, full speed
Pentium M (130 nm)	32 KB	1024 KB, full speed
Celeron M (90 nm)	32 KB	512 KB, full speed
Celeron M (130 nm)	32 KB	512 KB, full speed

Memory – DDR 200
- High-speed registered DDR SDRAM
- 72-bit wide with error correction (ECC)
- 512 MB to 2 GB with soldered chips

Dual Gigabit Ethernet – Intel 82546EB
- Highly integrated Dual Channel Ethernet Controller with 64-bit/66 MHz PCI local bus DMA
- 64 KB Transmit and Receive FIFO
- 10/100/1000BaseT auto-negotiation
- Versions with front I/O available
- Rear Ethernet: VITA 31.1-2003 compliant

Hard Disk or Flash Drive
- Internal 2.5" IDE hard disk or 2.5" flash drive (for extended temperature range and higher shock/vibration immunity)

PMC Extension Slots - IEEE P1386/1386.1
- Compliant to ANSI/VITA 20-2001 (conduction cooled only)
- One high bandwidth 64-bit/66 MHz PMC and one 32-bit/33 MHz PMC interface
- Enhancement to processor PMC standard VITA 32-2003 (non-monarch)
- Cardbus adapter available on PMC2

  Note: The 32-bit/33 MHz PMC slot is not available with VGA or Ethernet on the front, IDE secondary installed

  Note: PMC front I/O is not supported with VR9 in conduction cooled version

Serial I/O - RS232/422/485
- Two async. 16550-compatible full-duplex serial channels at rear I/O
- High-speed transfer up to 115.2 kbaud with 16 byte FIFOs
- User selectable RS232/422/485 interface
- COM1 optional available at front

VGA and LCD – NVIDIA® GeForce™4 410/420 Go (VR9 board version 2.x only)
- 256-bit 3D and 2D graphics accelerator
- On-chip 32 MB frame buffer (66-190 MHz)
- 32-bit/66 MHz PCI interface
- Dual CRTC/Simultaneous Dual Display
- 350 MHz Palette-DAC for analog VGA (up to 1600 x 1200)
- DVI-I interface (PanelLink) for TFT displays up to 1024 x 1200, single channel DVI (165 MHz), EDID display PnP supported
- Fully compliant support for OpenGL 1.2 for all supported Windows operating systems and Linux

VGA and LCD - ATI MOBILITY RADEON (VR9 board version 3.x only, RoHS version)
- 128/256-bit 2D, 3D and multimedia graphics accelerator
- Local DDR memory (16 MB or 64 MB) @125 MHz to 200 MHz
- 32-bit/66 MHz PCI interface
- Dual independent CRT controllers to support two asynchronous simultaneous display paths
- RAMDOC (300 MHz to 400 MHz) for analog VGA (1600 x 1200)
- TDMS transmitter up to 165 MHz (1024 x 768 at 60 Hz); DVI
- Full support of OpenGL 1.3 (Windows) and xFreeX86 (Linux)
- Support for DirectX 6.0 to DirectX 8.1 under Windows

EIDE
- Ultra ATA/100 sync. DMA mode up to 100 MB/sec
- PIO mode 4 and bus master IDE up to 16 MB/sec
- Two devices supported via local EIDE connector and two devices alternative with PMC32/33 rear I/O

General Purpose I/O
- 8 bits general purpose I/O
- Multiplexed with DVI output

USB 2.0
- One USB 2.0 connector at front
- Two universal serial bus channels at rear

Keyboard and Mouse
- PS/2 compatible

Real-time clock
- RTC 146818 compatible, on-board Li-battery

CMOS RAM
- 242 bytes non-volatile CMOS RAM

EEPROM
- 512 Kbit serial EEPROM for non-volatile user data

Watchdog
- Watchdog 1: 4.8 sec to 76 sec, 0.6 sec increments
- Watchdog 2: 1 min to 255 min, 1 min increments
- User programmable

Timer
- Activates IRQ under software control (200 µsec - 20 msec)

Temperature Sensor
- CPU die software readable from –65°C to +127°C, 1°C increments and 3 board, heatsink, card edge temperature sensors

LED
- Front panel LED System control

BIOS Features
- New AMI BIOS Core 8, in-system programmable Flash ROM
- CPU, memory and IDE auto-detection/selection
- Integrated VGA, and Ethernet BIOS ROM
- USB Mass Storage support and booting capability (Floppy, HDD, CDROM)
- Password protection, BIOS post, system and video BIOS shadowing
- Extensive setup with remappable serial/parallel ports
- Operation without disk, keyboard and video
- Remote BIOS through serial port

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Software

- The following software is supported to the extent listed below.

OS	On Request	Planned
WIN XP	-	✓
QNX 6	-	✓
VxWorks	-	✓
Lynx OS	✓	-
Linux	-	✓

Front and Rear I/O (with transition module VTM21)

- The pinouts of the transition module connectors (rear I/O) corresponds to standard PC connectors (press-fit cables).

Function	Front Air Cooled	Rear P2/P0
DVI-I	-	✓*5
VGA	✓*3	✓*1
Eth 1	✓*2*3	✓*2
Eth 2	✓*2*3	✓*2
Keyb+Mouse	✓	✓
Reset	✓	✓
LEDs	✓	✓
USB 2.0 1-3	✓	1-2
IDE primary	-	✓
IDE secondary	onboard*3	-
COM 1-2	1	1, 2
GPIO (8 pins)	-	✓*5
PMC 64-bit/66 MHz	✓	✓
PMC 32-bit/33 MHz	✓*3	✓*3*4

*1Rear DVI-I connector for DVI and VGA
*2Either front or rear as an order option
*3The 32-bit/33 MHz PMC slot is not available with VGA or Ethernet on the front, IDE secondary installed
*4Full PMC (32-bit/33 MHz) rear I/O without IDE primary Partly PMC (32-bit/33 MHz) rear I/O with IDE primary
*5DVI-I (DVI-D pins) are shared with GPIO pins

Styles

Non-RoHS	C	I	R	N
RoHS	1	3	6	8
Front Panel	yes	yes	yes	no
Front Stiffener	no	no	no	yes
Middle Stiffener	no	no	yes	yes
Wedge Locks	no	no	no	yes
Parts Soldered	yes	yes	yes	yes
Li-Battery	yes	yes	no	no
Extended Temp.	no	yes	yes	yes
Conformal Coating	no	no	yes	yes
Conduction Cooled	no	no	no	yes

Power Requirements

- +5 V, +3.3 V – required
- ±12 V – if required by mounted PMC module

Power Consumption - typical operating current

- Without keyboard, hard disk, modules, Ethernet (no link), measured at DOS prompt, no power savings

Processor, Memory	5V	3.3V	Total Power
1.0 GHz, 1 GB	1.8 A	5.9 A	28.5 W
1.3 GHz, 1 GB	2.2 A	5.9 A	30.5 W
1.4 GHz, 2 GB	2.0 A	5.9 A	29.5 W
1.6 GHz, 2 GB	2.7 A	5.9 A	33.0 W
1.8 GHz, 2 GB	2.5 A	5.9 A	32.0 W

- Without keyboard, hard disk, modules, Windows XP, 3D graphics active. Both Gigabit Ethernet channels linked, CPU running at instruction mix for maximum power consumption.

Processor, Memory	5V	3.3V	Total Power
1.0 GHz, 1 GB	2.4 A	7.5 A	36.8 W
1.3 GHz, 1 GB	4.6 A	7.5 A	47.8 W
1.4 GHz, 2 GB	2.7 A	7.5 A	38.3 W
1.6 GHz, 2 GB	5.4 A	7.5 A	51.8 W
1.8 GHz, 2 GB	4.8 A	7.5 A	48.8 W

Power Allowances - PMC slot

- +5 V, +3.3 V — Total power max. 7.5 W
- ±12 V — 100 mA each

Mechanical

- 6U, 1 slot wide, (233 x 160 x 20 mm) including flash drive
- Compliant to IEEE Std. 1101.2-1992 for conduction cooled board

Temperature

NOTE: For detailed information about the operating temperature behavior of any style board, it is absolutely necessary to consult the manual. The processor type, speed, altitude the use or not of Ethernet and video, ambient conditions, and the type of cooling influence the board temperature range.

- Temperature - air cooled
  All values under typical conditions w/o PMC module, HDD or flash drive

	Operating	Storage
Standard	0°C to +70°C	–40°C to +85°C
Extended	–40°C to +85°C	–40°C to +85°C

- Temperature – conduction cooled
- Values under typical conditions w/o ccPMC module, HDD and flash drive

	Operating	Storage
Extended	–40°C to +85°C	–40°C to +85°C

Humidity

Operating	Storage
5 - 95% @ 40°C	5 - 95% @ 40°C

Altitude

Operating	Storage
15.000 ft. (4.5 km)	40.000 ft. (12 km)

- Vacuum for conduction cooled board (style N or 8)

Shock (3 axis, up & down, 5 hits/direction)

- Style (C, I, 1, 3) — 12g / 6 ms
- Style (R, 6) — 20g / 6 ms, 3 axis
- Style (R, 6) — 100g / 6 ms, 40g / 11 ms

Vibration (30 minutes each axis)

- Style (C, I, 1, 3) — 2g rms @ 5 to 100 Hz
- Style (R, 6) — 2g rms @ 5 to 2000 Hz
- Style (R, 6) — 14g rms @ 5 to 2000 Hz

MTBF

- Calculations are available in accordance with MIL-HDBK-217. Please contact GE Intelligent Platforms.

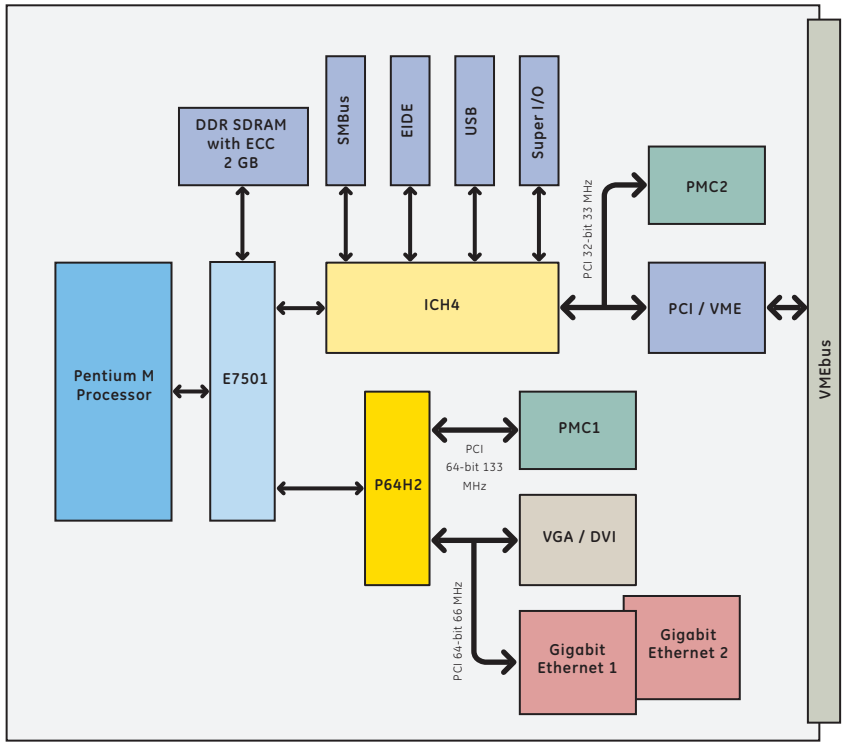
Safety

- Designed to meet standard UL1950, CE class A, FCC-A

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Block Diagram



Ordering Information

Hardware Accessories

VTM21	I/O transition module for 6U backplane (IEEE 1101.11-1998 compliant)
SCC78UM05VR9	VR9 starter cage, 19", 7U, 84HP, VME64 slots, fans, HDD and DVD
ZKADVI2VGA	DVI-I to VGA DSUB HD15 adapter
ZKAAPS2SPLIT	Cable for keyboard and mouse on front panel

Operating Systems Extensive operating systems support is available (see page 2).

Chassis with power supplies, backplanes and drives on request. For detailed information and further options, contact GE Intelligent Platforms.

About GE Intelligent Platforms

GE Intelligent Platforms, a General Electric Company (NYSE: GE), is an experienced high-performance technology company and a global provider of hardware, software, services, and expertise in automation and embedded computing. We offer a unique foundation of agile, advanced and ultra-reliable technology that provides customers a sustainable advantage in the industries they serve, including energy, water, consumer packaged goods, government and defense, and telecommunications. GE Intelligent Platforms is a worldwide company headquartered in Charlottesville, VA and is part of GE Home and Business Solutions. For more information, visit www.ge-ip.com.

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