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Find the *RadiSys EPC-8* at our website: ***Click HERE***

RadiSys® EPC®-8

Highly integrated Intel486™-based VMEbus Embedded CPU

System Overview

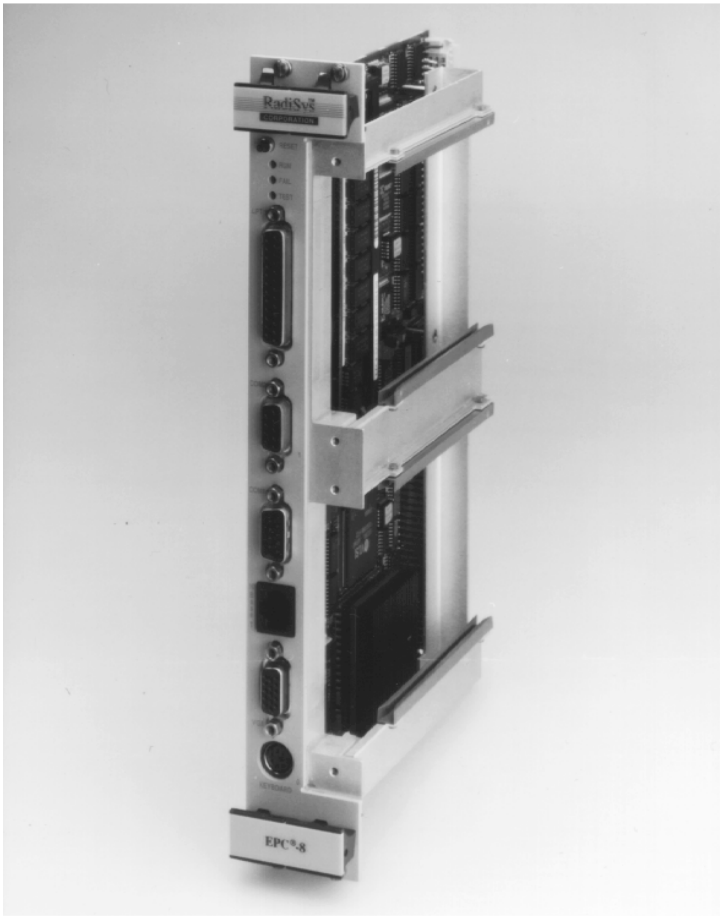
Two-slot version of EPC-8 VMEbus CPU module

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The RadiSys EPC-8 VMEbus CPU module is a high-performance Intel486-based PC designed for a variety of embedded applications, complete with Super VGA and Ethernet on a single board. The integrated module is well-suited for both networked and standalone implementations.

EPC-8 Feature Summary:

- High-performance Intel486 DX2 processor running at 50 or 66MHz
- Single-slot VMEbus (6U) form factor
- Local bus Super VGA graphics controller
- On-board Ethernet controller
- Up to 16MB DRAM



- Optional 128KB of memory-mapped SRAM and 2MB flash memory
- Expansion capability using EXM expansion interface and EXM modules
- Phoenix BIOS
- RS-232 DTE serial port (COM1)
- Parallel port (LPT1)
- RS-422/485 port (COM2)
- PC/AT-compatible keyboard interface
- Watchdog timer
- Full 32-bit VMEbus master interface, including:
  - A32/A24/A16:D32/D16/D08 master capabilities
  - Generation and receipt of all seven VMEbus interrupts
  - Full slot-1 controller functionality with four-level priority arbitration
- On-board byte-swapping hardware

Orderable Options

- 4MB, 8MB or 16MB DRAM
- Two slot version with built-in slots for adding EXM modules
- 2MB flash memory with 128KB of battery backed SRAM

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Technical Overview

HARDWARE ARCHITECTURE

The computing functions of the EPC-8 are performed by the 32-bit Intel486 microprocessor, with on-chip math coprocessor and four-way set associative cache memory. The processor is connected to on-board DRAM through a 64-bit wide high-performance local bus providing zero-wait-state performance. The EPC-8 is fully software-compatible with other 386/486 family CPUs.

In addition to its 32-bit VMEbus interface, the EPC-8 uses a 16-bit PC/AT-like expansion bus (EXM) to facilitate local embedded PC expansion without interference to the VMEbus. The standard configuration of the EPC-8 is a single-slot form factor, but the module is also available as a two-slot version with built-in support for two EXM expansion modules.

The EPC-8's flash BIOS and on-board I/O controllers connect through the internal I/O bus, providing AT-compatible addressing with full DMA capability.

The modular expandability of the EXM interface makes it easy to enhance the EPC-8 with peripherals. RadiSys expansion modules are available in various categories of functionality, including the following:

- Mass storage modules, for example, solid-state disk modules and IDE, floppy disk and SCSI controllers
- I/O modules, including digital, digital-to-analog and analog-to-digital modules
- Communication modules, such as serial and parallel port modules, modem interface modules and PCMCIA controllers

Many third-party add-in card vendors also design and market additional EXM modules.

To provide the connectivity for local EXM expansion, a RadiSys EXP-BP subplane is required with the EPC-8. The subplane connects the EPC to the VMEbus and to the EXM Expansion Interface simultaneously in a highly reliable configuration that requires no ribbon cables. The subplane assembly installs on top of standard VMEbus J1 and J2 backplane connectors. The subplane draws power from the VMEbus but does not affect VMEbus traffic.

CPU

The EPC-8 module offers two CPU configurations based on Intel's family of powerful 32-bit processors. The module is available with the Intel486 DX2 processor running at either 50MHz or 66MHz. Each processor includes on-chip cache memory and a math coprocessor.

The CPU module delivers 32-bit, workstation-level performance for off-the-shelf PC-based operating systems including DOS, Windows and OS/2.

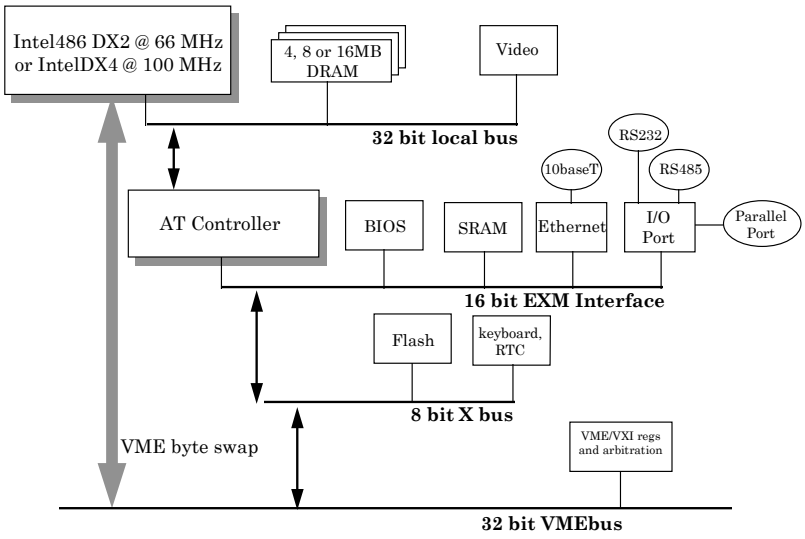
DRAM SUBSYSTEM

On-board memory consists of 4, 8 or 16MB of DRAM. This memory is not accessible from the VMEbus. Hardware memory mapping of the DRAM enables the use of 640KB of DOS conventional memory and from 3MB to 15MB of extended memory, depending upon the EPC-8 DRAM configuration.

FLASH AND SRAM

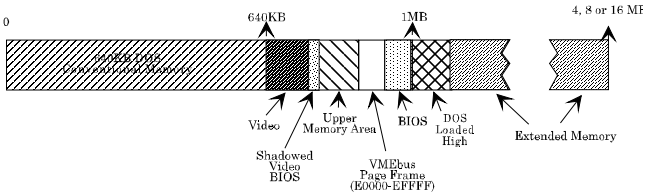
The flash memory option for the EPC-8 module provides 2MB of flash memory. The EPC-8 allows booting directly from flash memory in systems without hard disk drives. Software is provided to enable DOS users to use flash at a read-only DOS disk. For other operating systems, the flash is I/O-mapped.

Included with the flash option is 128KB of battery-backed SRAM. This SRAM is memory-mapped at the top of the EPC-8's memory range. With the flash/SRAM orderable options, small diskless systems can be built.



EPC-8 CPU Module Block Diagram

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EPC DOS Memory Map

BIOS

The EPC-8 module uses a standard PC-compatible BIOS licensed from Phoenix and optimized by RadiSys specifically for the EPC-8. The BIOS program runs automatically at system startup from a 128KB flash BIOS EPROM. System configuration parameters are stored in battery-backed CMOS RAM.

Also included on the EPC-8 is 32KB of VGA BIOS.

SUPER VGA CONTROLLER

For optimal graphics performance, the EPC-8 incorporates a Cirrus Logic CL-GD5428 video chip and 512KB of video DRAM. Resolutions of 640 x 480 (16 or 256 colors), 800 x 600 (16 or 256 colors) and 1024 x 768 (16 colors) are supported. The Super VGA controller runs on the local bus and requires no mezzanine boards. A standard female DB15 connector is included on the front panel.

ETHERNET CONTROLLER

The EPC-8 incorporates an Ethernet controller on-board. The Ethernet controller is compatible with Novell NE2000, NE2000+ and Western Digital Modes. A 10baseT connector is provided on the front panel.

I/O PORTS

The EPC-8 CPU module includes standard PC I/O interfaces on its front panel: an RS-232 DTE serial port (COM1) with 9-pin male D-shell connector; a parallel printer port (LPT1) with 25-pin female D-shell connector; an RS-422/485 port; and a PC/AT-compatible keyboard interface with IBM PS/2-style 6-pin mini-DIN connector. Also included is a standard PC/AT speaker.

WATCHDOG TIMER

The EPC-8 includes a watchdog timer that can signal a watchdog timer event upon overflow. This feature can be enabled or disabled by the application software. It is user-defined to cause either an interrupt or a system reset.

VMEBUS INTERFACE

A full VMEbus master interface is provided for communication with I/O, memory and other processor boards. Memory-locking operations (read-modify-write cycles) are fully supported, allowing transparent and reliable semaphores.

The EPC-8 contains a full set of VMEbus system controller functions, the ability to generate and receive all seven VMEbus interrupt levels, and a subset of the VMEbus Extensions for Instrumentation (VXIbus). The VMEbus configuration registers can be accessed directly or, more conveniently, by way of RadiSys EPConnect development and run-time software. VMEbus controller functions include round-robin or four-level priority bus arbitration, IACK daisy-chain driving, SYSCLK generation, and bus address time-out detection. The system controller provides both ROR (release-on-request) and RONR (release-on-no-request) bus release mechanisms. Slot-1 control functions can be disabled via configuration jumper. The VXIbus extensions provide well-defined multiprocessor communication channels and protocols and allow dynamic system configuration.

VMEBUS ADDRESSING

Special windowing hardware on the EPC-8 allows the Intel486 processor to access all three (A32, A24 and A16) VMEbus address spaces from within the DOS/Windows and OS/2 environment. The windowing hardware provides programmable registers that add high order bits to the processor's basic memory address. The VMEbus address range is viewed as a 64KB logical page that can be accessed through a block of addressable memory known as the page frame. This page frame is located in the reserved area (E000:xxxxh) above the conventional DOS 640KB memory boundary. The VMEbus can also be accessed through protected mode addressing.

The VMEbus mapping registers can be directly programmed with simple I/O writes.

As a VMEbus master, the processor can generate D32, D16 and D08 data transfers in the A32, A24, and A16 address spaces. In addition, on-board byte-swapping hardware enables data conversion between big endian (Motorola format) and little endian (Intel format) byte orderings to facilitate high-speed data sharing.

EPCONNECT SOFTWARE

To facilitate development, RadiSys offers EPConnect™, a software environment that reduces the time required to develop and integrate VMEbus systems based on RadiSys EPCs. EPConnect includes development, debug and run-time software packages that integrate seamlessly with the underlying operating system including, DOS, Windows and OS/2.

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ENVIRONMENTALS

CHARACTERISTIC		VALUE
Temperature	operating	0° to 60°C
	storage	-40° to 85°C
Humidity	operating	5 to 95% (non-condensing)
	storage	5 to 95% (non-condensing)
Altitude	operating	0 to 10,000 ft. (3000 m)
	storage	0 to 40,000 ft. (12,000 m)
Vibration	operating	2.5 g acceleration over 5 to 2000 Hz sine wave (P-P), 1 oct/min. sine sweep
	storage	5 g acceleration over 5 to 2000 Hz sine wave (P-P), 1 oct/min. sine sweep
Shock	operating	30 g, 11 msec duration, half-sine shock pulse
	storage	50 g, 11 msec duration, half-sine shock pulse

POWER	
Typical	+5V @ 5.1A, +12V @ 100mA, -12V @ 100mA
Maximum	+5V @ 6.2A, +12V @ 100mA, -12V @ 100mA

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