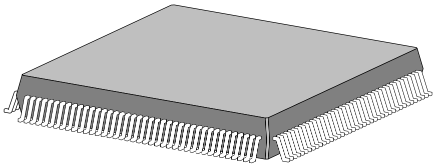
Digital Semiconductor

DECchip 21142 PCI Fast Ethernet LAN Controller

Product Brief

December 1995



Description

The DECchip 21142 PCI Fast Ethernet LAN Controller, which supports direct memory access (DMA), is a single-chip bus master, 10/100Mb/s device with a direct interface to the PCI local bus. It is fully compliant with the IEEE 802.3 100BASE-T draft for Fast Ethernet. The DECchip 21142 is based on the DECchip 21140 PCI Fast Ethernet LAN Controller architecture.

The DECchip 21142 provides a 10Mb/s twisted-pair (TP) interface and attachment unit interface (AUI), and a 10/100Mb/s complete media-independent interface (MII). The integration of this chip provides a low-cost 10Mb/s and 10/100Mb/s solution. It requires no external memory.

Features

- Supports two network ports: 10Mb/s and 10/100Mb/s
- Provides standard 10/100Mb/s MII
- Contains onchip integrated AUI port and a 10BASE-T transceiver
- Enables automatic detection and correction of 10BASE-T receive polarity
- Supports autodetection between AUI, TP, and MII ports
- Supports full-duplex operation on both 10Mb/s and 10/100Mb/s ports
- Provides internal and external loopback capability on both ports
- Contains a variety of flexible address filtering modes
- Offers a unique, patented solution to Ethernet capture-effect problem
- Contains large independent receive and transmit FIFOs. No additional onboard memory is required
- Includes a powerful onchip DMA with programmable burst size, providing for low CPU utilization
- Implements unique, patent-pending intelligent arbitration between DMA channels to minimize underflow or overflow
- Supports PCI clock speed frequency from dc to 33 MHz; network operation with PCI clock from 25 MHz to 33 MHz
- Supports an unlimited PCI burst
- Supports PCI read multiple command
- Supports early interrupt on transmit
- Implements low-power management with two power-saving modes (sleep or snooze)
- Supports both PCI 5.0-V and 3.3-V signaling environments
- Supports either big or little endian byte ordering for buffers and descriptors
- Contains a 4-bit, general-purpose programmable register and corresponding I/O pins
- Supports interrupts from two general-purpose pins
- Provides LED support for for various network activity indications
- Provides MicroWire interface for serial ROM (1K and 4K EEPROM)
- Provides an upgradable boot ROM (flash/EEPROM) interface up to 256KB
- Supports automatic loading of subvendor ID configuration register
- Supports CardBus
- Implements JTAG-compatible test-access port with boundary-scan pins
- Supports IEEE 802.3 and ANSI 8802-3 Ethernet standards
- Implements low-power, 3.3-V CMOS technology

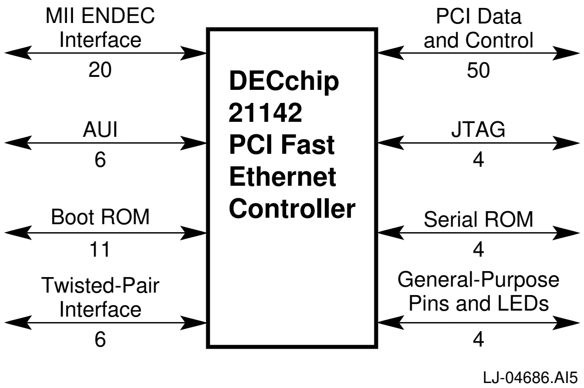
DECchip 21142 Microarchitecture

The DECchip 21142 has a direct interface to the PCI local bus. It communicates with the host processor by using onchip command and status registers, and a shared host memory area. Most of the required setup and initialization is done after power-up. The DECchip 21142 software interface and data structures are optimized to minimize the host CPU load and to allow for maximum flexibility in the buffers' descriptor management. The DECchip 21142 comes with large onchip FIFOs, so no additional onboard memory is required. The two FIFOs and the internal microarchitecture provide complete support for full-duplex operation.

On the network side, the DECchip 21142 has separate 10/100Mb/s and 10Mb/s ports. It provides a direct interface to the external 10/100Mb/s (MII) front-end-decoder (ENDEC), and to the attachment unit interface (AUI) and 10BASE-T connections. It contains the complete MII interface.

Figure 1 shows the functional groups of DECchip 21142 interface pins.

Figure 1 DECchip 21142 Pin Interface



System Application Examples

The DECchip 21142 is optimized for PCI-based systems. It implements a direct interface to 10/100Mb/s ENDEC for 100BASE-T and 100BASE-X, and it ensures complete MII compliance. A direct connection to 10BASE-T is made through the twisted-pair port and to 10BASE2 and 10BASE5 through the AUI port.

The DECchip 21142 is a high-performance, highly integrated solution for a variety of applications such as:

- Minimum-space, cost-effective integrated PCI motherboard controller
- Cost-effective, high-performance PCI to Fast Ethernet adapter card
- PCI-based internetworking applications such as a Fast Ethernet switch or a Fast Ethernet router port
- Low-cost Fast Ethernet bridge

Figure 2 shows a PCI motherboard system. Figure 3 shows a possible adapter design using the DECchip 21142. This adapter is capable of interfacing to both 10Mb/s Ethernet and 10/100Mb/s Fast Ethernet networks.

Figure 2 PCI Motherboard System

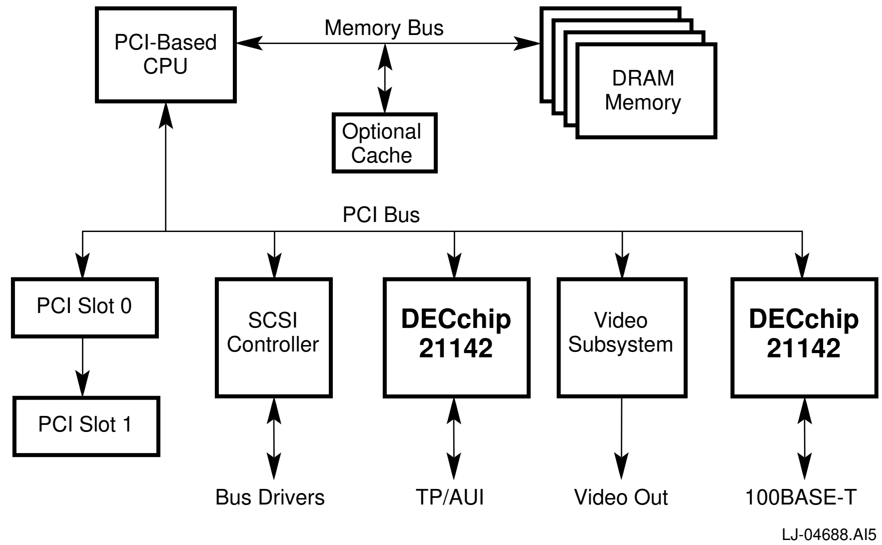


Figure 3 10/Mb/s and 100Mb/s Fast Ethernet PCI Adapter

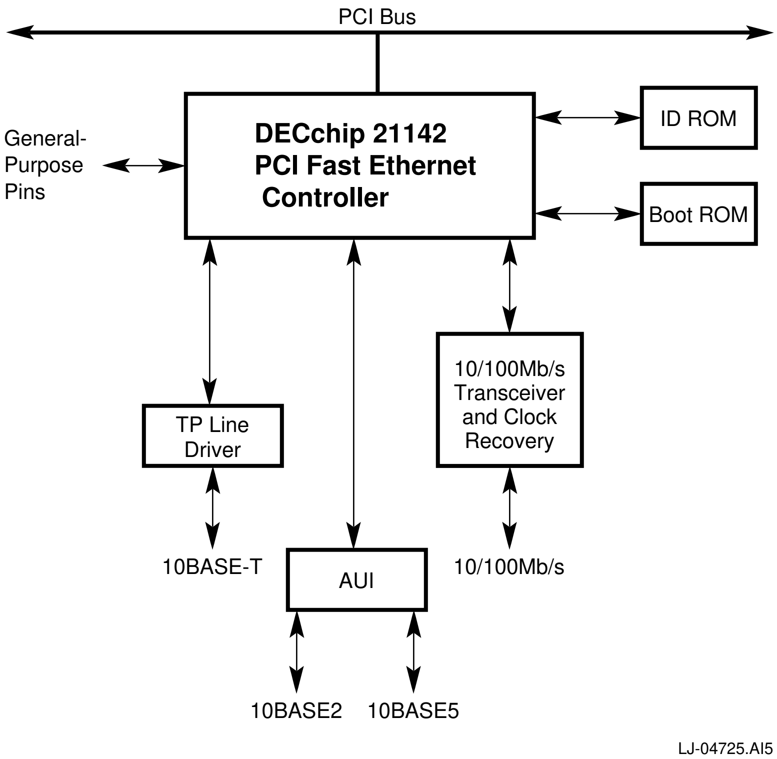
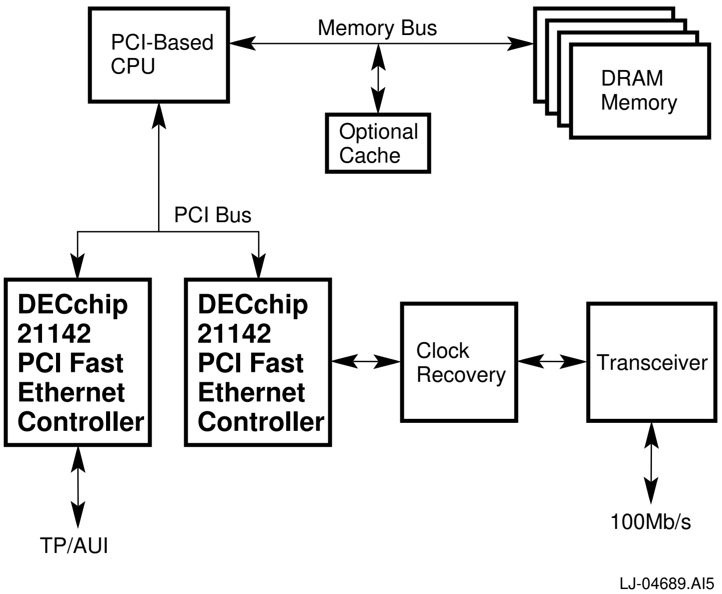


Figure 4 shows a PCI-based bridge and switch using the DECchip 21142.

Figure 4 PCI-Based Bridge and Switch



Complete Solution

A DECchip 21142 evaluation board kit provides all the tools necessary for hardware engineers to design a PCI Fast Ethernet Controller board for a variety of products.

The kit includes a PCI evaluation board with both 100BASE-T and 10BASE-T connections. It also includes software drivers, documentation, schematics, and gerber files.

DECchip 21142 Characteristics

Characteristic	Specification
Power supply	**vdd** = 3.3 V **vdd_clamp** = 5 V or 3.3 V
Operating temperature range	0°C to 70°C
Storage temperature range	–55°C min, +125°C max
Power dissipation	0.8 W @ **vdd**=3.3V Freq=33-MHz PCI clock
Package	144-pin PQFP

For More Information

To learn more about availability of the DECchip 21142 and the evaluation board kit, contact your local semiconductor distributor. To learn more about our product portfolio, contact the Digital Semiconductor Information Line:

1-800-332-2717

Outside North America, call:

+1-508-628-4760

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