EtherWORKS TURBO PCI Ethernet Adapter

Customer Technical Information

Order Number: EK-DE435-TM.A01

This document describes the EtherWORKS TURBO PCI Ethernet Adapter (DE435) and provides information about the features, specifications, and use of the DE435.

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Contents

Preface

Purpose

This document provides detailed information regarding the features, specifications, and use of the EtherWORKS TURBO PCI Ethernet Adapter (DE435).

Audience

This document is intended for people with some experience using or upgrading computer systems.

References

Refer to the *EtherWORKS TURBO PCI Ethernet Adapter User Information manual*, Order Number EK-DE435-OM.A01, for further information about the DE435.

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Overview

Introduction

The EtherWORKS TURBO PCI Ethernet Adapter (DE435) offers high performance at a low cost, enabling PCs and servers operating on a variety of platforms to reach services on multivendor Ethernet and Digital networks–quickly and affordably.

The DE435 combines the best of Digital's system and network design knowledge to provide superior performance, robustness, and leading-edge features suitable for all client/server applications.

EtherWORKS TURBO PCI Ethernet Adapter

The DE435 is a processor-independent network adapter designed for the peripheral component interconnect (PCI) bus. This advanced adapter uses the DECchip 21040 Ethernet controller chip as its core to provide support for the Digital PCI-based Alpha AXP and DECpc XL systems and industry-standard PCI-based platforms from Intel and other vendors.

The DE435 provides a connection from PCI-compatible systems (laptop and desktop PCs, high-end workstations, and multiprocessor servers) to IEEE 802.3/Ethernet local area networks (LANs). It enables you to attach your system to a network using ThinWire, AUI thickwire, or twisted-pair Ethernet cables.

Features

The main features of the DE435 are as follows:

- High-performance 32-bit direct memory access (DMA) architecture.
- Capable of full-duplex (20 Mb/s) operation in 10BaseT mode.
- Low CPU utilization in the host computer.
- PCI BIOS plug-and-play operation.
- Supports 10Base2 (ThinWire), 10Base5 (AUI thickwire), and 10BaseT (twisted-pair) Ethernet connections.
- Comprehensive software device driver support for industry-standard network operating systems: Novell NetWare V3.x and V4.x Server and Client; Microsoft Windows NT for Intel and Alpha AXP platforms; NDIS V2.0 for PATHWORKS Client; Microsoft Windows for Workgroups V3.1x; NDIS OS/2 for PATHWORKS Server; SCO UNIX stream driver; IBM LAN Server; and OpenVMS and OSF/1 platforms.
- Efficient system resource usage and outstanding system bus latency tolerance through the use of optimized system interface design and large 256 bytes on-chip FIFOs.
- Back-to-back high performance transmit and receive functions allow minimum inter-packet gaps.
- High-performance transmit and receive capabilities and flexible address filtering modes.
- Uses low-power CMOS technology.
- FCC, VDE Class B certification.

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Network Interfaces

Introduction

The EtherWORKS TURBO PCI Ethernet Adapter supports 10Base2 (ThinWire), 10Base5 (AUI thickwire), and 10BaseT (twisted-pair) Ethernet connections.

ThinWire Interface

The DE435 connects to a ThinWire network using a T-connector attached to the BNC connector located on the adapter's mounting bracket. The adapter's shunt jumper is in the default position (connecting pin rows 1 and 2).

Twisted-Pair Interface

The DE435 connects to a twisted-pair network using a twisted-pair cable connector plugged into the 8-pin (RJ45) connector located on the adapter's mounting bracket. The adapter's shunt jumper has no effect when used with a 10BaseT twisted-pair network interface.

AUI Interface

The DE435 connects to an AUI network using an AUI cable connector plugged into the 15-pin AUI connector located on the adapter's mounting bracket. Before installing the DE435, the adapter's shunt jumper setting must be changed by rotating the assembly 180°, then positioning it over pin rows 2 and 3.

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Setup and Diagnostics

Introduction

The EtherWORKS TURBO PCI Ethernet Adapter works with the computer's BIOS to automatically configure the system. The system's configuration can be customized using the standard BIOS Setup utility. The DE435 distribution diskette contains the Diagnostic utility.

Setup Utility

The Setup utility enables the user to select and permanently store information about the computer's hardware and software in the battery-backed memory of the CMOS RAM. This information takes effect each time the computer boots and can be changed each time Setup is run.

Option Settings

The following table shows the available DE435 option settings.

System Parameter	Allows you to...
Enable/disable device	Individually enable or disable each PCI slot. The default is enable.
IRQ	Individually set an IRQ default for each PCI slot (none, IRQ 5, 9, 10, 14, or 15). The default is 5.
Enable/disable master	Enable or disable a PCI device that requires master capability. The default is enable.
Latency timer	Set the PCI latency timer (in PCI clocks) for each PCI device. The default is F8h (7.44 usec).

Diagnostic Utility

The DE435 distribution diskette contains the NICDIAG Diagnostic utility, which is run to ensure that the settings meet system requirements and to verify module functionality. The NICDIAG.EXE and DIAG.EXE files must be in the same directory to run diagnostics.

The Diagnostic utility prevents diagnostics from running if the utility detects an *active* DE435 (one that has a network device driver loaded).

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General Specifications

Introduction

This chapter provides general system specifications and test requirements for the EtherWORKS TURBO PCI Ethernet Adapter.

Physical Description

The DE435 is a +5.0 volt PCI printed circuit board that uses the full 32-bit bus data path interface. The DE435 can be used in systems that have +5.0 volts or universal PCI bus slots. The adapter measures 5.086 inches (129 mm) x 3.750 inches (95 mm) and is constructed using four-layer circuit board technology with two signal layers and two power/ground layers.

Components

The main DE435 components are:

- DECchip 21040
- On-board 3.3 V voltage regulator for the 21040
- Ethernet network protocol controller (MAC)
- 10BaseT twisted-pair Ethernet (RJ45 connector) network interface
- 10Base2 ThinWire Ethernet (coaxial) network interface
- 10Base5 AUI thickwire Ethernet network interface

Electrical Parameters

The following table shows the electrical parameters for the DE435.

Cable Type	Shunt Jumper	Power Maximum	DC Amps (+5.0 V) Maximum	DC Amps (+12.0 V) Maximum
Twisted-pair[1]	ThinWire	3.4 W	0.2 A	0.2 A
	thickwire	1.0 W	0.2 A	0 A
ThinWire		3.4 W	0.2 A	0.2 A
AUI thickwire[2]	thickwire	7.0 W	0.2 A	0.5 A

[1]When using twisted-pair cable, the shunt jumper position affects the amount of power consumed by the DE435.

[2]When using the AUI thickwire cable, the amount of +12.0 V dc power used depends on the transceiver or MAU to which the adapter is connected.

Operating Environment

The following table shows the operating environment specifications for the DE435.

Condition	Value
Temperature (at sea level)	15°C—32°C (59°F—90°F)
Relative humidity	8% to 80% (non-condensing)
Radiated emissions	FCC Class B, VDE Class B

LEDs

The following table describes the DE435 LEDs.

LED	Indicates	And the status is...
Amber	Network activity	**On** or **blinking**—Network is active.
		Off—Network is inactive.
Green[1]	TP link	**On**—Link is OK.
		Off—Link has failed
		Blinking—Link is failing.

[1]This LED is used when twisted-pair or twisted-pair full-duplex mode is selected and a twisted-pair cable is attached to the network.

When the network or diagnostic software is running, the network activity LED turns on whenever data is detected on the network. With low levels of network activity, the LED blinks on. As network activity increases, the LED blinks faster and, at times, appears to remain on.

When the network or diagnostic software is running, and twisted-pair or twisted-pair full-duplex mode is selected, the twisted-pair link LED turns on if receive data or twisted-pair link pulses are detected. If no receive data or twisted-pair link pulses are detected within 150 milliseconds, the twisted-pair link LED turns off, indicating twisted-pair link fail status. When twisted-pair link disabled or AUI thickwire or ThinWire mode is selected, this LED remains on.

DECchip 21040 Interface

The DECchip 21040 PCI interface to the PCI bus includes a 32-bit address/data bus with I/O and DMA control signals.

See Chapter 7, Network Interface, of the *DECchip 21040 Ethernet LAN Controller for PCI Hardware Reference Manual* for 10BaseT and AUI chip interface functions.

Control and Status Registers (CSRs)

The DECchip 21040 uses eight configuration registers for initialization and configuration. These registers are used to identify and query the DECchip 21040.

The DECchip 21040 contains 12 CSRs (CSR0 through CSR11) for communication with the driver to the host. It communicates with the serial interface attachment (SIA) using four additional CSRs (CSR12 through CSR15). See Chapter 3, Registers, in the *DECchip 21040 Ethernet LAN Controller for PCI Hardware Reference Manual* for further information.

Environmental and Regulatory Tests

The DE435 is designed and built by Digital to meet exacting standards of quality and reliability.

Government Standards

The DE435 has been certified for radio emissions worldwide:

- U.S.—FCC Class B (FCC ID: AO9-DE435)
- Germany—VDE Class B
- Japan—VCCI Class B

Digital Standards

The DE435 has passed extensive interoperability tests at the system and network levels to meet the requirements of the following standards:

- **Digital Standard 102—Environmental Standard for Computers and Peripherals**

  This standard establishes the product requirements and conditions for temperature, humidity, altitude, and levels of mechanical shock and vibration for desktop systems.

- **Digital Standard 103—Electromagnetic Compatibility (EMC)**

  This standard defines the requirements for the EMC certification process, product labeling, EMI requirements that comply with external EMI requirements, and acceptable levels of electromagnetic immunity against interference from radio/television transmitters and other electromagnetic equipment. This standard also defines the Electrostatic Discharge (ESD) limits for Digital's enclosure-level hardware products.

- **Digital Standard 134—Digital CSMA/CD (Ethernet) Local Area Network Specification**

  This standard provides Ethernet and ThinWire Ethernet requirements.

- **Digital Standard 119—Digital Product Safety**

  This standard defines detailed test procedures for hardware product design, voltage, and temperature limits in compliance with internal and external safety standards.

- **Digital Standard 200—Digital Network Architecture**

  This standard describes the structure, functions, interfaces, and protocols needed for the low-level maintenance of a DECnet network.

Reliability

The theoretical MTBF of the DE435 is 100,000 hours (per PREDIC program) based on MIL-H-217E, Ground Fixed, 25°C system temperature, with a 15°C module temperature rise.