CP306-V

3U CompactPCI
Celeron® M / Pentium® M Based
CPU Board

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USER GUIDE

Apter Power

The product described in this manual is in compliance with all applied CE standards.

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1. Introduction

1.1 System Overview

The CompactPCI board described in this manual operates with the PCI bus architecture to support additional I/O and memory-mapped devices as required by various industrial applications. For detailed information concerning the CompactPCI standard, please consult the complete Peripheral Component Interconnect (PCI) and CompactPCI Specifications. For further information regarding these standards and their use, visit the home page of the *PCI Industrial Computer Manufacturers Group (PICMG)*.

Many system-relevant CompactPCI features that are specific to Kontron Modular Computers CompactPCI systems may be found described in the Kontron CompactPCI System Manual. Due to its size, this manual cannot be downloaded via the internet. Please refer to the section “Related Publications” at the end of this chapter for the relevant ordering information.

The CompactPCI System Manual includes the following information:

- Common information that is applicable to all system components, such as safety information, warranty conditions, standard connector pinouts etc.
- All the information necessary to combine Kontron’s racks, boards, backplanes, power supply units and peripheral devices in a customized CompactPCI system, as well as configuration examples.
- Data on rack dimensions and configurations as well as information on mechanical and electrical rack characteristics.
- Information on the distinctive features of Kontron CompactPCI boards, such as functionality, hot swap capability. In addition, an overview is given for all existing Kontron CompactPCI boards with links to the relating data sheets.
- Generic information on the Kontron CompactPCI backplanes, such as the slot assignment, PCB form factor, distinctive features, clocks, power supply connectors and signalling environment, as well as an overview of the Kontron CompactPCI standard backplane family.
- Generic information on the Kontron CompactPCI power supply units, such as the input/output characteristics, redundant operation and distinctive features, as well as an overview of the Kontron CompactPCI standard power supply unit family.

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1.2 Board Overview

1.2.1 Board Introduction

The CP306-V is a CompactPCI system controller board. It has been designed to support all Intel® Celeron® M and Pentium® M processors with 400 MHz PSB (Processor Side Bus) in 478 µFCPGA packaging.

A key performance factor of the Intel Celeron M and Pentium M processors is the newly designed CPU core with an integrated 64 kB L1 and up to 2048 kB L2 cache, which provide more CPU power per MHz than an Intel Celeron® or an Intel Pentium® 4 processor.

The Celeron M and Pentium M have the advantage of very low power consumption, whilst at the same time providing impressive processor speeds ranging from 600 MHz through 2.0 GHz with a Processor Side Bus (PSB) running at 400 MHz. The CP306-V utilizes the Intel 855GME and I/O Controller Hub 4 (ICH4) chipset.

The board includes a SODIMM socket for up to 1 GB Double Data Rate (DDR) memory with Error Checking and Correcting (ECC) for rugged environments. The memory operates at 333 MHz (PC2700).

The CP306-V offers more features and expandability than other CompactPCI boards in its class. The board comes with two onboard Ultra ATA/100 interfaces and a built-in Intel 3D Graphics accelerator with up to 64 MB of shared memory for enhanced graphics performance with a DVI display interface on the front panel. Furthermore, the front panel provides one Fast Ethernet port (integrated in the chipset), one USB 2.0 port, one COM port (8HP only) and one PS/2 connector for mouse and keyboard. Several onboard connectors provide flexible expandability.

The board supports one configurable 32-bit/33 MHz CompactPCI interface.

The optional extension module provides a CompactFlash type II socket on the front panel. On this module it is possible to mount a 2.5” hard disk drive using a 44-pin connector.

Designed for stability and packaged in a rugged format, the board fits into all applications situated in industrial environments, including I/O intensive applications, making it a perfect core technology for long life applications. Components which have high temperature tolerance have been selected from embedded technology programs, and therefore offer long-term availability.

The board is offered with the Microsoft® Windows® 2000, Windows® XP operating systems. Kontron further supports, as a standard, Windows® XP Embedded, Linux and VxWorks operating systems. Please contact Kontron Modular Computers for further information concerning other operating systems.

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1.2.2 Board-Specific Information

The CP306-V is a CompactPCI Celeron M and Pentium M based single-board computer specifically designed for use in highly integrated platforms with solid mechanical interfacing for a wide range of industrial environment applications.

Some of the CP306-V's outstanding features are:

- Socket for Intel Celeron M and Pentium M microprocessors up to 2.0 GHz (and higher when available) in a 478 µFCPGA package
- Up to 2048 kB L2 cache on-die, running at CPU speed
- 400 MHz processor system bus
- 855GME and 82801DB (ICH4) chipset
- SODIMM socket for up to 1024 MB DDR SDRAM memory running at 333 MHz (PC2700)
- Integrated 3D high performance VGA controller
- Digital (DVI) display support with up to 1600x1200 pixels at 24-bit and 60 Hz
- Analog display support with up to 2048 x 1536 pixels at 16-bit and 60 Hz
- One Fast Ethernet interface (82559-style)
- Two EIDE Ultra ATA/100 interfaces
- One front USB 2.0 port
- Two rear I/O USB 2.0 ports
- Compatible with CompactPCI spec. Rev. 3.0
- 1 MB onboard FWH for BIOS
- Hardware Monitor (LM87)
- Watchdog timer
- Real-time clock
- Two COM ports
  - One switchable to front or rear I/O
  - One only for rear I/O
- I/O extension connector (LPC)
- 8HP or 4HP, 3U CompactPCI
- Several rear I/O configurations
- Jumperless board configuration
- Standard temperature range: 0°C to + 60°C
- Passive heat sink solution
- Phoenix BIOS

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1.3 Optional Modules

1.3.1 CP306-V-IOIDE Module

The CP306-V-IOIDE module has been designed to provide the CP306-V with a CompactFlash socket and an interface to a 2.5” HDD which enable the user to connect P-ATA devices to the board. Furthermore, the module provides a Reset button and an LED indicating the operation of EIDE devices. The module is connected to the 44-pin EIDE Connector J11 on the 8HP version of the CP306-V. Refer to Appendix A for further information on the CP306-V-IOIDE module.

1.3.2 CP-RIO3-03 Rear I/O Module

Designed for use with a 32-bit rear I/O variant of the CP306-V and a backplane with system slot rear I/O capability, this module provides rear I/O interfacing for the two standard RS232 serial interfaces, one Fast Ethernet interface, two USB 2.0 interfaces, one primary EIDE interface, one PS/2 interface, one fan sense signal. Refer to Appendix B for further information on the CP-RIO3-03 Rear I/O module.

1.4 System Relevant Information

The following system relevant information is general in nature but should still be considered when developing applications using the CP306-V.

Table 1-1: System Relevant Information

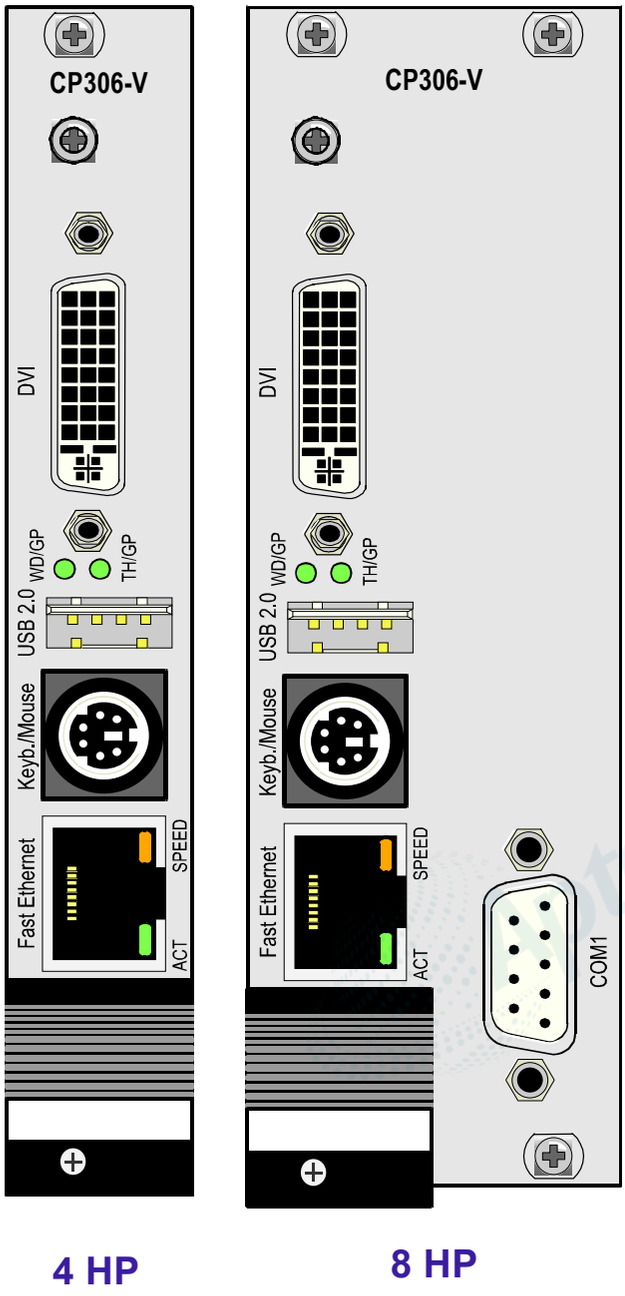
SUBJECT	INFORMATION
System Configuration	A CP306-V master board can support up to 7 peripheral boards with 32-bit and 33 MHz.
Master/Slave Functionality	The CP306-V can operate only as a master board.
Board Location in the System	The CP306-V board must be installed in a master slot of a CompactPCI backplane.
Hot Swap Compatibility	The CP306-V supports the addition or removal of other boards whilst in a powered-up state. Individual clocks for each slot and ENUM signal handling are in compliance with the PICMG 2.1 Hot Swap specification.The CP306-V itself is not hot swap capable.
Hardware Requirements	The CP306-V can be installed in any CompactPCI 3U rack.
Operating Systems	The CP306-V can operate under the following operating systems: Microsoft Windows 2000 Microsoft Windows XP Microsoft Windows XP Embedded Linux VxWorks Please contact Kontron Modular Computers for further information concerning other operating systems.

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1.5.2 Front Panels

Figure 1-2: 4HP and 8HP Front Panel of CP306-V without Module



4 HP 8 HP

LEGEND:

CP306-V: 4HP and 8HP version

General Purpose LEDs

- WD/GP (green): Watchdog or General Purpose; when lit during bootup, it indicates a PCI reset is active.
- TH/GP (green): Overtemperature Status or General Purpose; when lit during bootup, it indicates a power failure.

Integral Ethernet LEDs

- ACT (green): Ethernet Link/Activity
- SPEED (orange): Ethernet Speed

Fast Ethernet

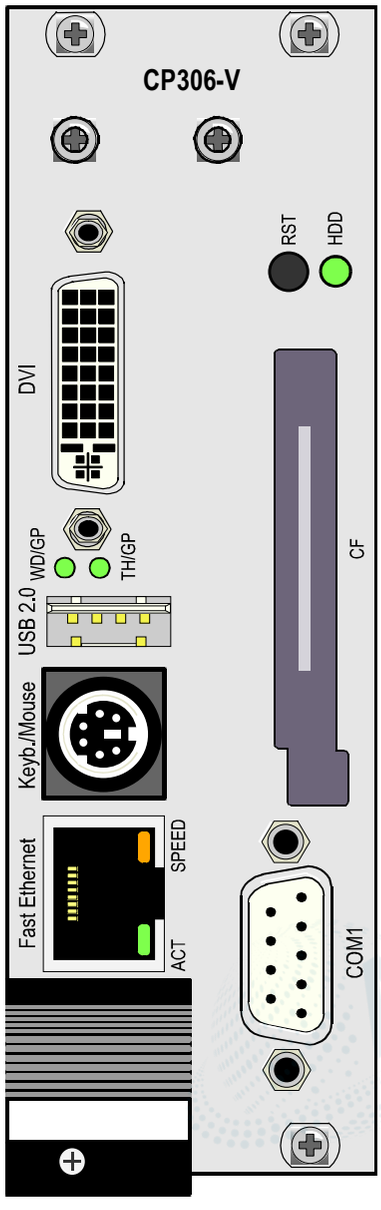
- Speed on: 100 Mbit
- Speed off: 10 Mbit

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Figure 1-3: 8HP Front Panel of CP306-V with CP306-V-IOIDE Module



LEGEND:

CP306-V: 8HP version

General Purpose LEDs

- WD/GP (green): Watchdog or General Purpose; when lit during bootup, it indicates a PCI reset is active.
- TH/GP (green): Overtemperature Status or General Purpose; when lit during bootup, it indicates a power failure.
- HDD (green): Monitors hard disk activity

Reset Button

- RST: Reset button

Integral Ethernet LEDs

- ACT (green): Ethernet Link/Activity
- SPEED (orange): Ethernet Speed

Fast Ethernet

- Speed on: 100 Mbit
- Speed off: 10 Mbit

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1.5.3 Board Layouts

Figure 1-4: CP306-V Board Layout (Top View)

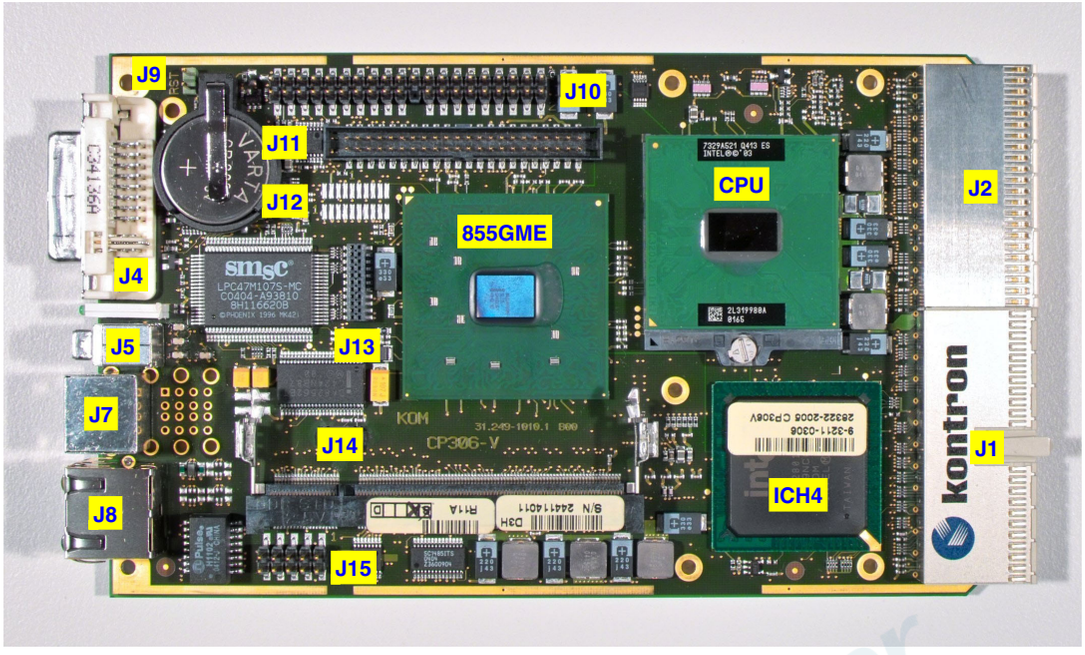
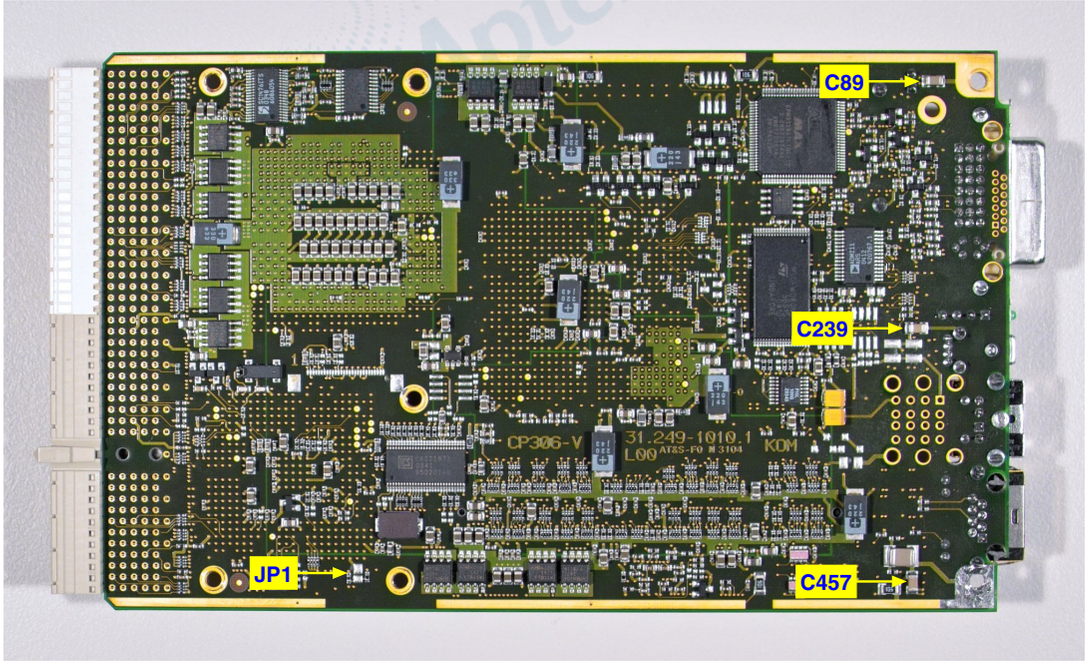


Figure 1-5: CP306-V Board Layout (Bottom View)



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1.6 Technical Specification

Table 1-2: CP306-V Main Specifications

	CP306-V	SPECIFICATIONS

Processor and Memory	CPU	The CP306-V supports the following microprocessors:
		• Intel Celeron M processors with 400 MHz PSB (Processor Side Bus) in 478 µFCPGA packaging
		  • Intel Celeron M 1.3 GHz with 512 kB L2 cache
		• Intel Pentium M processors with 400 MHz PSB (Processor Side Bus) and SpeedStep® technology in 478 µFCPGA packaging
		  • Intel Pentium M 1.6 GHz with 1 MB L2 cache
		  • Intel Pentium M 745, 1.8 GHz with 2 MB L2 cache
		Please contact Kontron Modular Computers for further information concerning the suitability of other Intel processors for use with the CP306-V.

	Memory	Main Memory:
		• Up to 1024 MB DDR333 (PC2700) DDR SDRAM memory on SODIMM module
		Cache structure:
		• 64 kB L1 on-die full speed processor cache
		  • 32 kB for instruction cache
		  • 32 kB for data cache
		• Up to 2048 kB L2 on-die full speed processor cache
		FLASH Memory:
		• 1 MB FLASH for BIOS
		Mass Storage Device (only with CP306-V-IOIDE extension module):
		• CompactFlash socket type II (true IDE mode with DMA support)
		Serial EEPROM: 24LC64 (64 kbit)

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Table 1-2: CP306-V Main Specifications (Continued)

	CP306-V	SPECIFICATIONS
Chipset	Intel 855GME chipset	855GME Graphics Memory Controller Hub (GMCH) • Support for a single Celeron M or Pentium M microprocessor • 64-bit AGTL/AGTL+ based System Bus interface at 400 MHz • 64-bit System Memory interface with optimized support for DDR SDRAM memory at 333 MHz with ECC (additional 8-bits for ECC) • Integrated 2D and 3D Graphics Engines • Integrated H/W Motion Compensation Engine • Integrated 350 MHz DAC
	Intel ICH4	82801DB I/O Controller Hub (ICH4) • PCI Rev. 2.2 compliant with support for 32-bit/33 MHz PCI operations • Power management logic support • Enhanced DMA controller, interrupt controller, and timer functions • Integrated IDE controller Ultra ATA/100/66/33 • USB 2.0 host interface six USB ports • One integrated LAN controller (82559 style) • System Management Bus (SMBus) compatible with most I²C™ devices • Low Pin Count (LPC) interface • Firmware Hub (FWH) interface support
Interfaces	CompactPCI	Compliant with CompactPCI Specification PICMG® 2.0 R 3.0 • System master operation • 32-bit / 33 MHz master interface • 3.3V / 5.0V compatible (default configuration is 5.0V)
	Rear I/O	The following interfaces are routed to the rear I/O connector J2: • COM1 and COM2 (TTL signaling) • 2 x USB 2.0 • 2x fan sense • CRT VGA • Fast Ethernet • Primary EIDE • General purpose signals • PS/2 mouse and keyboard
	Hot Swap	The CP306-V supports the addition or removal of other boards whilst in a powered-up state. Individual clocks for each slot and Enum signal handling are in compliance with the PICMG 2.1 Hot Swap Specification. The CP306-V itself is not hot swap capable.
	VGA	Built-in Intel 3D Graphics accelerator for enhanced graphics performance. • Supports resolutions of up to 2048 x 1536 by 16-bit at a 60 Hz refresh rate or up to 1280 x 1024 by 24-bit true colors at 85 Hz refresh rate in analog mode (CRT). • Hardware motion compensation for software MPEG2 and MPEG4 de-coding • The graphics controller provides flexible allocation of video memory up to 64 MB.

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Table 1-2: CP306-V Main Specifications (Continued)

	CP306-V	SPECIFICATIONS
Interfaces	Fast Ethernet	One 10Base-T/100Base-TX Fast Ethernet port integrated within the ICH4 controller (82559-style): • One RJ45 connector on the front panel • Support for rear I/O interfacing • May only be operated at either of the above interfacing points • Automatic mode recognition Cabling requirement: Category 5, UTP, two-pair cabling.
	USB	Up to three USB ports supporting UHCI and EHCI: • One USB 2.0 connector on the front panel • Two USB 2.0 connectors on the rear I/O interface
	Serial	Two UARTs, 16C550 compatible. • Two for rear I/O, whereas one of them can be switched over to front panel
	Keyboard and Mouse	Keyboard and mouse are supported • USB Support on 8HP and 4HP • PS/2 on front panel or rear I/O

	Mass Storage	EIDE Ultra ATA/100/66/33
		• Two interfaces
		  • Primary interface routed to rear I/O and a 44-pin, 2 mm, male pin-row connector, for example, for mounting the CP306-V-EXT-IO-IDE module or a 2.5” HDD
		  • Secondary interface routed to a 40-pin, 2.54 mm, male pinrow connector (standard)
		• Up to four EIDE devices
		CompactFlash (with extension module only):
		• CompactFlash type II socket (true IDE mode with DMA support)
		• Supports type I and II CompactFlash cards and Microdrive

	I/O Extension Interface	I/O extension interface: • Female, pinrow connector • LPC devices

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Table 1-2: CP306-V Main Specifications (Continued)

	CP306-V	SPECIFICATIONS
General	Mechanical	3U CompactPCI compliant form factor 4HP and 8HP versions
	Power Consumption	See Chapter 6 for details
	Temperature Range	Operational: 0°C to +60°C Standard Storage: -55°C to +85°C Without hard disk -40°C to +65°C With hard disk
	Climatic Humidity	93% RH at 40°C, non-condensing (acc. to IEC 60068-2-78)
	Dimensions	100 mm x 160 mm
	Board Weight	4HP: 334 grams (with heat sink) 8HP: 410 grams (with heat sink and without mezzanine boards)
	Battery	3.0V lithium battery for RTC with battery socket. Recommended types: • VARTA CR2025 • PANASONIC BR2020
Sockets	Front Panel Connectors	• DVI-I: 29-pin connector for DVI or CRT devices • USB: one 4-pin USB connector • Ethernet: one RJ-45 connector • PS/2: one 6-pin connector for mouse and keyboard • CompactFlash: one 50-pin connector, optional • RS232: one D-SUB 9 connector
	Onboard Connectors	• Two EIDE interfaces supporting Ultra ATA/100/66/33 for two devices (hard disks or CD-ROMs) on 40-pin/2.54mm and 44-pin/2 mm connectors. • I/O extension connector • CompactPCI Connector J1 and J2 • 478 µFCPGA socket for Celeron M and Pentium M CPUs • 200-pin socket for DDR SODIMM modules with or without ECC

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Table 1-2: CP306-V Main Specifications (Continued)

	CP306-V	SPECIFICATIONS
HW Monitoring	LEDs	System status: • TH/GP: green: Overtemperature status or general purpose; when remains lit during bootup, it indicates a power failure. • WD/GP: green: Watchdog or general purpose; when remains lit during bootup, it indicates a PCI reset is active Fast Ethernet status: • ACT: green: Network activity • SPEED on: orange: 100 Mbit • SPEED off: 10 Mbit
	Watchdog	Software configurable Watchdog generates IRQ, NMI, or hardware reset.
	Thermal Management	CPU overtemperature protection is provided by: • Internal processor temperature control unit • CPU shut down via hardware monitor • Custom designed heat sinks
	System Monitor	LM87 hardware monitor for supervision of: • All system power voltages • Two fan speed inputs
Software	Software BIOS	Phoenix BIOS with 1 MB of Flash memory and having the following features: • QuickBoot • QuietBoot • MultiBoot III • LAN-boot capability for diskless systems • Boot from USB floppy • BIOS boot support for USB keyboards • Software enable/disable function for the rear I/O, Ethernet • Plug and play capability • BIOS parameters are saved in the EEPROM • Board serial number is saved within the EEPROM • PC Health Monitoring
	Operating Systems	Operating systems supported: • Microsoft Windows 2000 • Microsoft Windows XP • Microsoft Windows XP Embedded • Linux • VxWorks Please contact Kontron Modular Computers for further information concerning other operating systems.

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