

» User Guide «

CP3002

**3U CompactPCI Processor Board based on
the Intel® Core™ i7 Processor with
the Intel® QM57 Chipset**

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This product has been manufactured to satisfy environmental protection requirements where possible. Many of the components used (structural parts, printed circuit boards, connectors, batteries, etc.) are capable of being recycled.

Final disposition of this product after its service life must be accomplished in accordance with applicable country, state, or local laws or regulations.



Explanation of Symbols



Caution, Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 60V) when touching products or parts of them. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your material.

Please refer also to the section “High Voltage Safety Instructions” on the following page.



Warning, ESD Sensitive Device!

This symbol and title inform that electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

Please read also the section “Special Handling and Unpacking Instructions” on the following page.



Warning!

This symbol and title emphasize points which, if not fully understood and taken into consideration by the reader, may endanger your health and/or result in damage to your material.



Note ...

This symbol and title emphasize aspects the reader should read through carefully for his or her own advantage.



For Your Safety

Your new Kontron product was developed and tested carefully to provide all features necessary to ensure its compliance with electrical safety requirements. It was also designed for a long fault-free life. However, the life expectancy of your product can be drastically reduced by improper treatment during unpacking and installation. Therefore, in the interest of your own safety and of the correct operation of your new Kontron product, you are requested to conform with the following guidelines.

High Voltage Safety Instructions



Warning!

All operations on this device must be carried out by sufficiently skilled personnel only.



Caution, Electric Shock!

Before installing a not hot-swappable Kontron product into a system always ensure that your mains power is switched off. This applies also to the installation of piggybacks.

Serious electrical shock hazards can exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable and any other cables which provide external voltages before performing work.

Special Handling and Unpacking Instructions



ESD Sensitive Device!

Electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.

Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.

It is particularly important to observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory backup, ensure that the board is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or conductive circuits on the board.



General Instructions on Usage

In order to maintain Kontron's product warranty, this product must not be altered or modified in any way. Changes or modifications to the device, which are not explicitly approved by Kontron and described in this manual or received from Kontron's Technical Support as a special handling instruction, will void your warranty.

This device should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This applies also to the operational temperature range of the specific board version, which must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.

In performing all necessary installation and application operations, please follow only the instructions supplied by the present manual.

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board, please re-pack it as nearly as possible in the manner in which it was delivered.

Special care is necessary when handling or unpacking the product. Please consult the special handling and unpacking instruction on the previous page of this manual.



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If the customer's eligibility for warranty has not been voided, in the event of any claim, he may return the product at the earliest possible convenience to the original place of purchase, together with a copy of the original document of purchase, a full description of the application the product is used on and a description of the defect. Pack the product in such a way as to ensure safe transportation (see our safety instructions).

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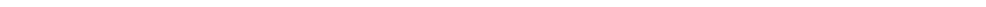
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Chapter

1

Introduction



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1. Introduction

1.1 Board Overview

The CP3002 is a highly integrated 3U, 4HP CompactPCI system controller board optionally expandable to 8HP and available either as a front I/O version or as a rear I/O version. It has been designed to support the multi-chip package Intel® Core™ i7 processor and the Intel® Celeron® processor in combination with the mobile Intel® QM57 Express chipset.

The board supports the Intel® Core™ i7-610E processor with 2.53 GHz frequency, the Intel® Core™ i7-620LE processor with 2.0 GHz frequency, and the Intel® Core™ i7-660UE processor with 1.33 GHz frequency, all with 64 kB L1 cache, 256 kB L2 cache and 4 MB L3 cache, as well as the Intel® Celeron® U3405 processor with 1.07 GHz frequency and 64 kB L1 cache, 512 kB L2 cache, 2 MB L3 cache. The processors are built on 32-nm technology and provided in a BGA package.

The processor is soldered on the CP3002 which results in higher Mean Time Between Failures (MTBF) and a significant improvement in cooling.

Two SODIMM sockets are available on the CP3002 to provide up to 8 GB dual-channel, third-generation Double Data Rate (DDR3) memory with Error Checking and Correcting (ECC) running at 1066 MHz. The graphics controller and the memory controller are integrated in the processor.

The board comes with two Gigabit Ethernet ports with Wake-on-LAN support (available on front I/O and switchable to rear I/O), one high-resolution VGA interface (CRT), two COM ports, as well as one onboard high-speed I/O extension connector for flexible 8HP expandability. In addition, six SATA interfaces are provided, one for the onboard SATA connector, one for the SATA Flash module, two for the high-speed I/O extension connector and two for rear I/O. Further interfaces include up to six USB 2.0 ports, two on front I/O, two on rear I/O, two for the onboard high-speed I/O extension connector. The CP3002 provides support for one 8HP I/O expansion module (CP3002-HDD) and one rear I/O module (CP-RIO3-04). The 4HP CP3002 further provides support for up to 16 GB SATA NAND flash memory (SSD) via a SATA Flash module. The SATA Flash module cannot be used in conjunction with the CP3002-HDD module.

The board supports one 32-bit/33 MHz CompactPCI interface. When installed in the system slot, the interface is enabled, and when installed in a peripheral slot, the CP3002 is isolated from the CompactPCI bus.

The CP3002 further provides safety and security features via a Trusted Platform Module (TPM) 1.2 on request.

Designed for stability and packaged in a rugged format, the board fits into all applications situated in industrial environments, including I/O intensive applications where only one slot is available for the CPU, 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.

There are various operating systems available for the CP3002. For detailed information, please contact Kontron.



1.2 Board-Specific Information

The CP3002 is a CompactPCI single-board computer based on the Intel® Core™ i7 and the Intel® Celeron processor and specifically designed for use in highly integrated platforms with solid mechanical interfacing for a wide range of industrial environment applications.

Some of the CP3002's outstanding features are:

- Support for the following multi-chip package (MCP) processors:
 - Intel® Core™ i7-610E (SV), 2.53 GHz, 4 MB L3 cache
 - Intel® Core™ i7-620LE (LV), 2.0 GHz, 4 MB L3 cache
 - Intel® Core™ i7-660UE (ULV), 1.33 GHz, 4 MB L3 cache
 - Intel® Celeron® U3405 (ULV), 1.07 GHz, 2 MB L3 cache
- Intel® QM57 Express chipset
- Up to 8 GB, dual-channel, DDR3 SDRAM memory with ECC running at 1066 MHz
- Integrated 3D high-performance graphics controller
- VGA display support for up to QXGA (2048 x 1536 pixels) resolution
- Two Gigabit Ethernet controllers with Wake-on-LAN support (Intel® 82574L), switchable to rear I/O
- Six Serial ATA (SATA) interfaces with SATA RAID 0/1/5/10 support:
 - One SATA interface for the standard SATA onboard connector
 - One SATA interface for the Serial ATA Flash module (SSD)
 - Two SATA interfaces for the high-speed I/O extension connector
 - Two SATA interfaces for rear I/O
- Six USB ports:
 - Two USB 2.0 on front I/O
 - Two USB 2.0 on rear I/O
 - Two USB 2.0 interfaces for the onboard high-speed I/O extension connector
- 32-bit, 33 MHz PCI CompactPCI interface for support of up to seven peripheral slots (7x REQ/GNT signals)
- Compatible with CompactPCI Specification PICMG 2.0 Rev. 3.0 and usable in the system controller slot as well as in a peripheral slot (the PCI interface is isolated in peripheral slot)
- TCG 1.2 compliant Trusted Platform Module (TPM), on request
- Two SPI boot flashes for two separate uEFI BIOS images:
 - One standard SPI boot flash
 - One recovery SPI boot flash
- Watchdog timer
- Battery-backed real-time clock (RTC)
- Two COM ports:
 - COMA either on the 8HP expansion module or on the rear I/O
 - COMB on the rear I/O
- Peripheral extension connectors:
 - High-speed I/O extension connector
 - SPI extension connector
- Rear I/O on the CompactPCI connector J2
- 4HP or 8HP, 3U CompactPCI
- Several rear I/O configurations
- Power-up sequencing and in-rush current optimized design
- Passive heat sink solution for forced airflow cooling
- AMI Aptio®, a uEFI-compliant platform firmware



1.3 System Expansion Capabilities

1.3.1 CP3002-HDD Module

The CP3002-HDD module for the 8HP CP3002 version provides legacy PC I/O ports. It includes one digital DVI port, two USB 2.0 ports, one COM port, and one CFast card socket. A SATA hard disk interface is also available for installing a Serial ATA 2.5" HDD or SSD. The CP3002-HDD module cannot be used in conjunction with the SATA Flash module.

For further information concerning the CP3002-HDD module, refer to Appendix A.

1.3.2 CP-RIO3-04 Rear I/O Module

The CP-RIO3-04 rear I/O module has been designed for use with the CP3002 board from Kontron and provides comprehensive rear I/O functionality.

For further information concerning the CP-RIO3-04 rear I/O module, refer to Appendix B.

1.3.3 Serial ATA Flash Module

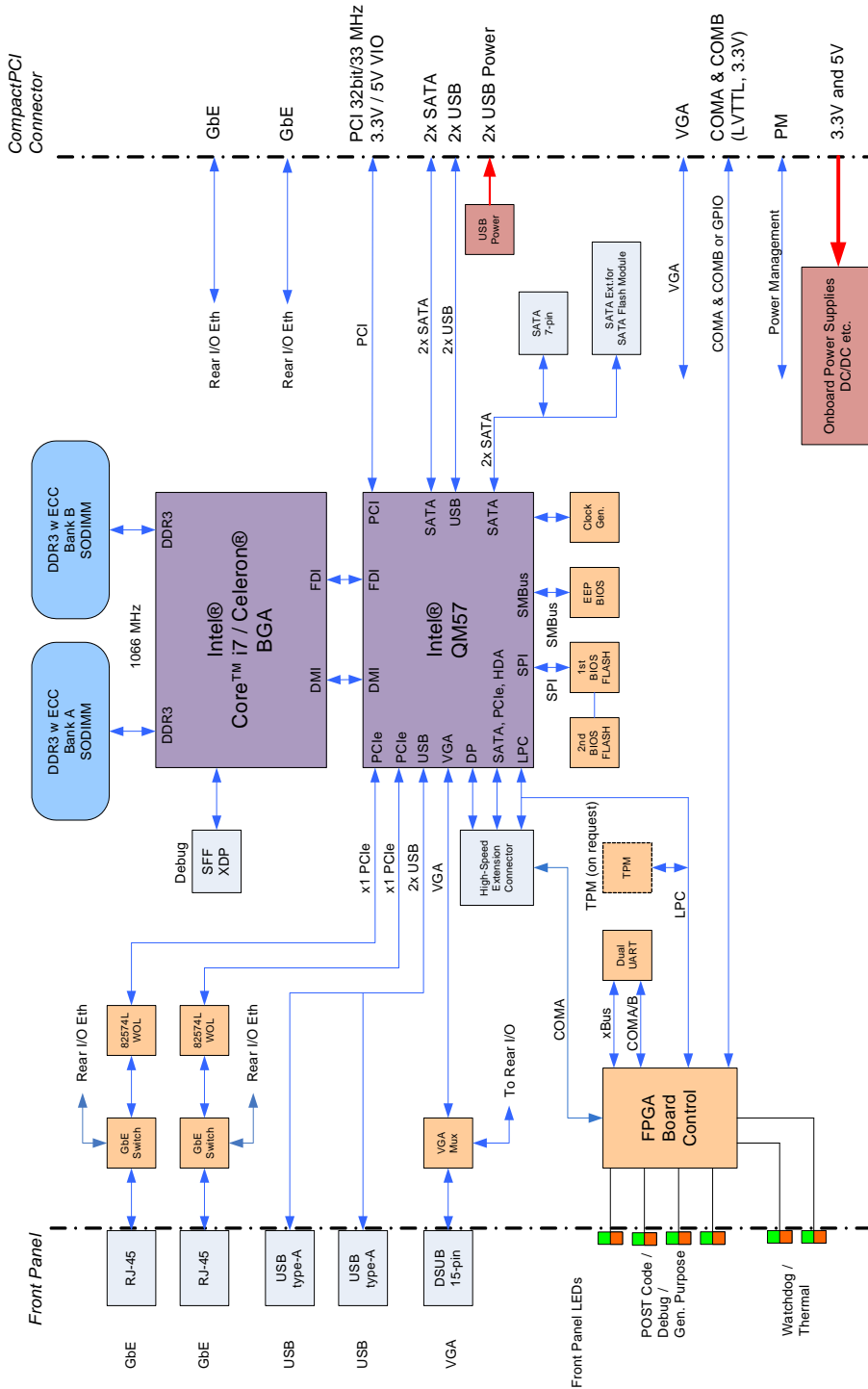
The 4HP CP3002 provides support for up to 16 GB of Serial ATA flash memory in combination with an optional Serial ATA Flash module, which is connected to an onboard connector. For further information concerning the Serial ATA Flash module, refer to Appendix C.

1.4 Board Diagrams

The following diagrams provide additional information concerning board functionality and component layout.

1.4.1 Functional Block Diagram

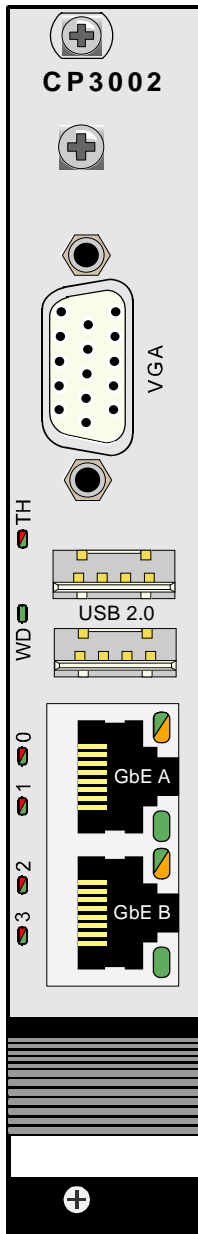
Figure 1-1: CP3002 Functional Block Diagram





1.4.2 Front Panel

Figure 1-2: 4HP CP3002 Front Panel



LEGEND:

Watchdog and Overtemperature Status LEDs:

WD (green): Watchdog Status
 TH (red/green): Overtemperature Status

General Purpose LEDs:

LED0..3 (red/green/red+green): General Purpose/POST Code



Note ...

If the General Purpose LEDs 0..3 are lit red during boot-up, a failure is indicated before the uEFI BIOS has started.

For further information, please contact Kontron.

Ethernet LEDs:

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



Note ...

For information regarding the front panel of the 8HP CP3002, refer to Appendix A, CP3002-HDD Module.



1.4.3 Board Layout

Figure 1-3: 4HP CP3002 Board Layout (Top View)

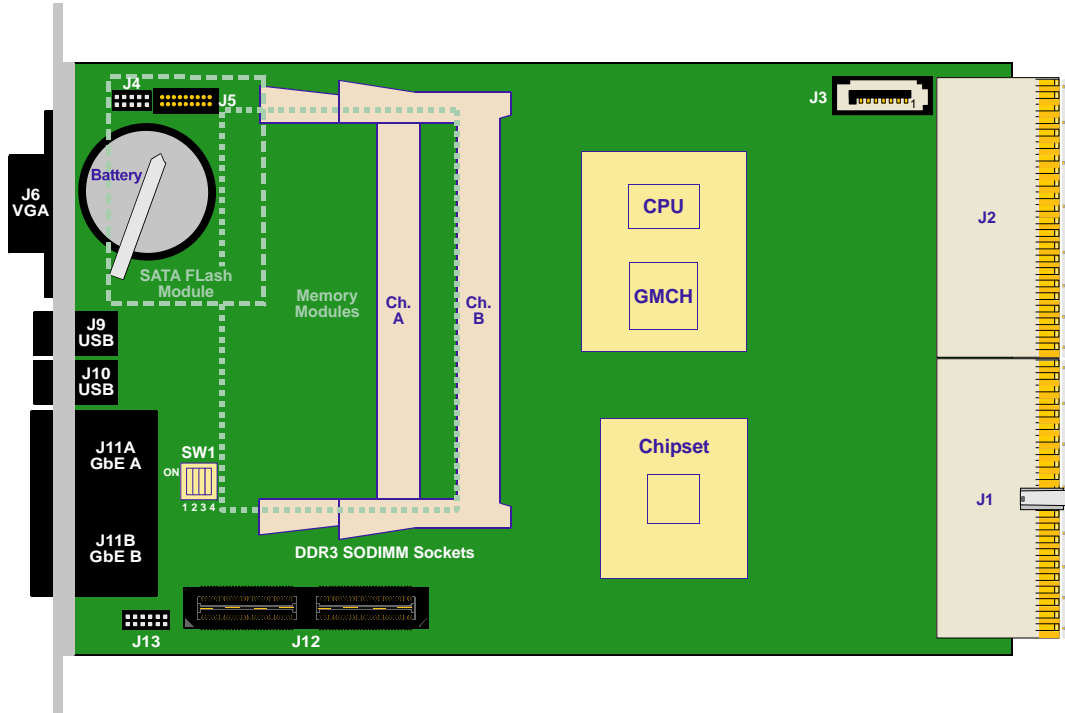
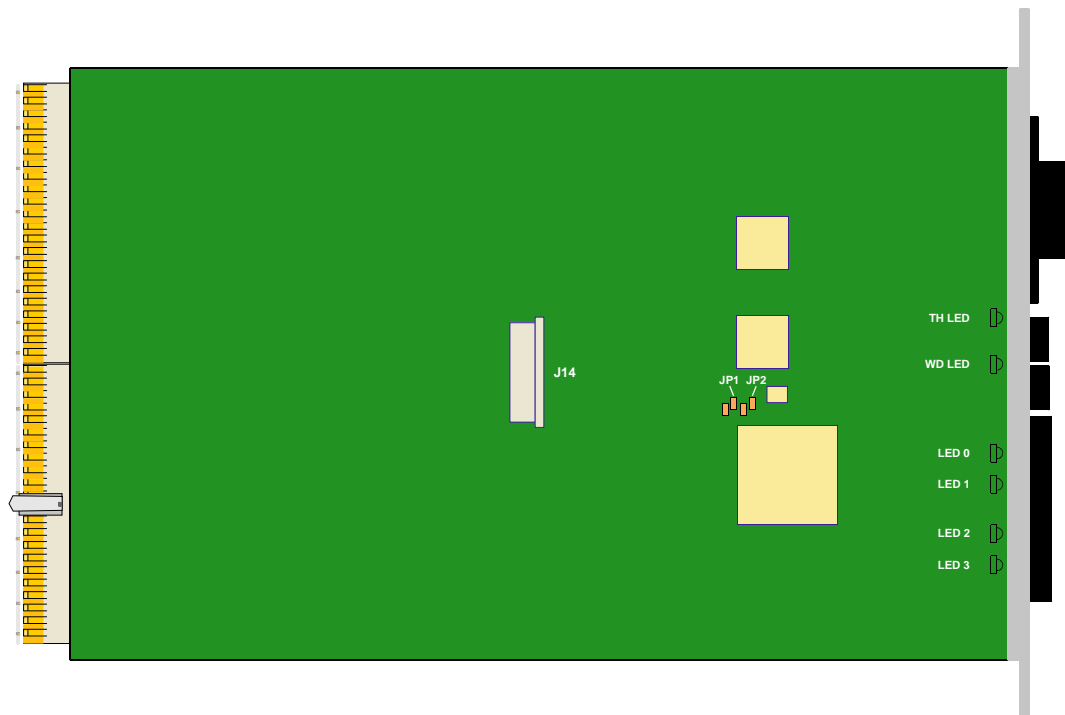


Figure 1-4: 4HP CP3002 Board Layout (Bottom View)





1.5 Technical Specification

Table 1-1: CP3002 Main Specifications

FEATURES		SPECIFICATIONS
Processor and Memory	CPU	<p>The CP3002 supports the following microprocessors:</p> <ul style="list-style-type: none"> • Intel® Core™ i7-610E (SV), 2.53 GHz, 4 MB L3 cache • Intel® Core™ i7-620LE (LV), 2.0 GHz, 4 MB L3 cache • Intel® Core™ i7-660UE (ULV), 1.33 GHz, 4 MB L3 cache • Intel® Celeron® U3405 (ULV), 1.07 GHz, 2 MB L3 cache <p>Further processor features:</p> <ul style="list-style-type: none"> • Two execution cores • Intel® Hyper-Threading Technology (Core™ i7) • Intel® 64 Architecture • Intel® Turbo Boost Technology (Core™ i7) • Intel® Intelligent Power Sharing (Core™ i7) • System Memory interface with optimized support for dual-channel DDR3 SDRAM memory at 1066 MHz with ECC • Integrated 2D and 3D Graphics Engines • DMI and FDI interfaces to the Intel® QM57 chipset • Two x8 PCI Express 2.0 ports operating at 2.5 GT/s <p>Please contact Kontron for further information concerning the suitability of other Intel processors for use with the CP3002.</p>
	Memory	<p>Main Memory:</p> <ul style="list-style-type: none"> • Up to 8 GB, dual-channel DDR3 SDRAM memory with ECC running at 1066 MHz on two SODIMM sockets <p>Cache Structure:</p> <ul style="list-style-type: none"> • 64 kB L1 cache for each core <ul style="list-style-type: none"> • 32 kB instruction cache • 32 kB data cache • Up to 512 kB L2 shared instruction/data cache for each core • Up to 4 MB L3 shared instruction/data cache shared between both cores <p>Flash Memory:</p> <ul style="list-style-type: none"> • Two redundant SPI boot flashes (2 x 8 MB) for two separate uEFI BIOS images • Up to 16 GB NAND flash via an onboard Serial ATA Flash module (SSD) <p>Serial EEPROM with 64 kbit</p>


Table 1-1: CP3002 Main Specifications (Continued)

FEATURES		SPECIFICATIONS
Chipset	Intel® QM57	Mobile Intel® QM57 Express Chipset: <ul style="list-style-type: none"> • Two x4 or eight x1 PCI Express 2.0 ports operating at 2.5 GT/s (only two x1 PCI Express ports are used) • SATA host controller with six ports, 3 Gbit/s data transfer rate and RAID 0/1/5/10 support • USB 2.0 host interface with up to 14 USB ports available (only six ports are used) • SPI flash interface support • Low Pin Count (LPC) interface • PCI interface, 32-bit/33 MHz • Power management logic support • Enhanced DMA controller, interrupt controller, and timer functions • System Management Bus (SMBus) compatible with most I²C™ devices • DMI and FDI interfaces to the processor • High Definition Audio (HDA) interface (not used) • Analog display port • Three digital display ports (only one port is used) • Integrated RTC
Integrated Controller	Graphics controller	High-performance 3D graphics controller integrated in the processor: <ul style="list-style-type: none"> • Support for two independent displays • Supports digital display resolutions up to 2560 x 1600 pixels @ 60 Hz • Supports analog display resolutions up to 2048 x 1536 pixels @ 75 Hz • Dynamic Video Memory Technology (DVMT)



Table 1-1: CP3002 Main Specifications (Continued)

FEATURES		SPECIFICATIONS
Interfaces	CompactPCI	<p>Compliant with CompactPCI Specification PICMG® 2.0 R 3.0:</p> <ul style="list-style-type: none"> • System master operation • 32-bit/33 MHz master interface • 3.3 V or 5 V (universal PCI interface) • Support for up to seven peripheral slots (7x REQ/GNT signals) <p>When installed in a peripheral slot, the CP3002 is isolated from the Compact-PCI bus. It receives power from the backplane and supports rear I/O.</p> <p>CP3002 removal under power:</p> <p>When installed in a peripheral slot, the CP3002 supports hot plugging on the power interface through a dedicated power controller, but not on the PCI interface.</p> <p>Hot swapping of peripheral boards controlled by the CP3002:</p> <p>When installed in the system controller slot, the CP3002 supports the hot swapping of other boards. Individual clocks for each slot and Enum signal handling are in compliance with the PICMG 2.1 Hot Swap Specification.</p> <p>The CP3002 itself, however, is not hot swappable. When installed in the system controller slot, the system must be powered down in order to replace the board.</p>
	Rear I/O	<p>The following interfaces are routed to the rear I/O connector J2:</p> <ul style="list-style-type: none"> • COMA and COMB (3.3V LVTTTL signaling) • 2 x USB 2.0 • VGA (analog) • 2x Gigabit Ethernet • 2x SATA • System management signals • Input for 5V standby power • General purpose signals
	Gigabit Ethernet	<p>Two 10 Base-T/100 Base-TX/1000 Base-T Gigabit Ethernet interfaces based on the Intel® 82574L Ethernet PCI Express bus controller individually switchable to front I/O or rear I/O:</p> <ul style="list-style-type: none"> • Dual RJ-45 connector on the front panel • Automatic mode recognition (Auto-Negotiation) • Automatic cabling configuration recognition (Auto-MDI/X) • Wake-on-LAN support
	USB	<p>Six USB ports supporting UHCI (USB 1.1) and EHCI (USB 2.0):</p> <ul style="list-style-type: none"> • Two USB 2.0 ports on the front I/O • Two USB 2.0 ports on the rear I/O interface • Two USB 2.0 interfaces for the onboard high-speed I/O extension connector

Table 1-1: CP3002 Main Specifications (Continued)



FEATURES		SPECIFICATIONS
Interfaces	Serial	Two 16C550-compatible UARTs: <ul style="list-style-type: none"> • COMA available on the 8HP expansion module or on rear I/O • COMB available on rear I/O only
	Serial ATA	Serial ATA Host Controllers integrated in the Intel® QM57 chipset: <ul style="list-style-type: none"> • Provide support for six SATA ports, two onboard, two on rear I/O, and two on the 8HP extension module • Data transfer rates up to 300 MB/s • High-performance RAID 0/1/5/10 functionality on all SATA ports
	I/O Expansion Interfaces	I/O expansion to 8HP board version: <ul style="list-style-type: none"> • 2x SATA • 2x USB2.0 • DP (DisplayPort) • COMA • Monitor and control signals • LPC • HDA • PCI Express
Sockets	Front Panel Connectors	<ul style="list-style-type: none"> • VGA: 15-pin D-Sub connector • USB: two 4-pin, type A connectors • Ethernet: dual RJ-45 connector
	Onboard Connectors	<ul style="list-style-type: none"> • 7-pin, L-form standard SATA II connector, J3 • High-speed I/O extension connector, J12 • SPI extension connector, J4 • 18-pin extension connector for SATA Flash module (SSD), J5 • JTAG connector, J13 • XDP-SFF (debug) connector, J14 • CompactPCI Connectors J1 and J2 • Two 204-pin DDR3 SODIMM sockets
LEDs	LEDs	<p>Watchdog and Overtemperature Status LEDs:</p> <ul style="list-style-type: none"> • WD (green): Watchdog Status • TH (red/green): Overtemperature Status <p>General Purpose LEDs:</p> <ul style="list-style-type: none"> • LED0..3 (red/green/red+green): General Purpose/POST Code <p>Ethernet LEDs:</p> <ul style="list-style-type: none"> • ACT (green): Network/Link Activity • SPEED (green/orange): Network Speed

Table 1-1: CP3002 Main Specifications (Continued)

FEATURES		SPECIFICATIONS
Timer	Watchdog Timer	<ul style="list-style-type: none"> • Software-configurable, two-stage Watchdog with programmable timeout ranging from 125 ms to 4096 s in 16 steps • Serves for generating IRQ or hardware reset
	System Timer	<ul style="list-style-type: none"> • The Intel® QM57 chipset contains three 8254-style counters which have fixed uses • In addition to the three 8254-style counters, the Intel® QM57 chipset includes eight individual high-precision event timers that may be used by the operating system. They are implemented as a single counter each with its own comparator and value register.
System Management	Thermal Management	<p>CPU and board overtemperature protection is provided by:</p> <ul style="list-style-type: none"> • Temperature sensors integrated in processor: <ul style="list-style-type: none"> • Two temperature sensors for monitoring the processor cores • One temperature sensor for monitoring the graphics controller and the memory controller • One temperature sensor integrated in the Intel® QM57 chipset for monitoring the chipset • Specially designed heat sink
Security	TPM	Trusted Platform Module (TPM) 1.2 for enhanced hardware- and software-based data and system security (on request)
Software	uEFI BIOS	<p>AMI Aptio®, AMI's next-generation BIOS firmware based on the uEFI Specification and the Intel Platform Innovation Framework for EFI.</p> <ul style="list-style-type: none"> • LAN boot capability for diskless systems (standard PXE) • Redundant image; automatic fail-safe recovery in case of a damaged image • Non-volatile storage of setting in the SPI flash (battery only required for the RTC) • Compatibility Support Module (CSM) providing legacy BIOS compatibility based on AMIBIOS8 • Command shell for diagnostics and configuration • EFI shell commands executable from mass storage device in a Pre-OS environment (open interface)
	Operating Systems	There are various operating systems available for the CP3002. For detailed information, please contact Kontron.



Table 1-1: CP3002 Main Specifications (Continued)

FEATURES		SPECIFICATIONS		
General	Mechanical	3U, 4HP, CompactPCI-compliant form factor		
	Power Consumption	See Chapter 5 for details.		
	Temperature Range	Operational: 0°C to +60°C	Standard (depending on processor version and airflow in the system)	
		-25°C to +70°C	Extended (depending on processor version and airflow in the system)	
		Storage: -55°C to +85°C	Without hard disk and without battery	
			Note ... When a battery is installed, refer to the operational specifications of the battery as this determines the storage temperature of the CP3002 (See "Battery" below).	
			Note ... When additional components are installed, refer to their operational specifications as this will influence the operational and storage temperature of the CP3002.	
Battery	3.0V lithium battery for RTC with battery socket. Recommended type: CR2025 Temperature ranges: Operational (load): -20°C to +70°C typical (refer to the battery manufacturer's specifications for exact range) Storage (no load): -55°C to +70°C typical (no discharge)			
Climatic Humidity	93% RH at 40 °C, non-condensing (acc. to IEC 60068-2-78)			
Dimensions	100 mm x 160 mm			
Board Weight	337 grams (4 HP CP3002 with heat sink, front panel, two 2 GB SODIMM memory modules, and battery but without SATA Flash module)			



Note ...

For a description of the additional 8HP version interfaces, refer to Appendix A, CP3002-HDD Module.



1.6 Standards

This product complies with the requirements of the following standards.

Table 1-2: Standards

TYPE	ASPECT	STANDARD
CE	Emission	EN55022 EN61000-6-3
	Immission	EN55024 EN61000-6-2
	Electrical Safety	EN60950-1
Mechanical	Mechanical Dimensions	IEEE 1101.10
Environmental	Climatic Humidity	IEC60068-2-78 (see note below)
	WEEE	Directive 2002/96/EC Waste electrical and electronic equipment
	RoHS	Directive 2002/95/EC Restriction of the use of certain hazardous substances in electrical and electronic equipment



Note ...

Kontron performs comprehensive environmental testing of its products in accordance with applicable standards.

Customers desiring to perform further environmental testing of Kontron products must contact Kontron for assistance prior to performing any such testing. This is necessary, as it is possible that environmental testing can be destructive when not performed in accordance with the applicable specifications.

In particular, for example, boards **without conformal coating** must not be exposed to a change of temperature exceeding 1K/minute, averaged over a period of not more than five minutes. Otherwise, condensation may cause irreversible damage, especially when the board is powered up again.

Kontron does not accept any responsibility for damage to products resulting from destructive environmental testing.

In addition, boards ordered with the ruggedized service comply with the following standards as well.

Table 1-3: Additional Standards for Boards Ordered with Ruggedized Service

TYPE	ASPECT	STANDARD	REMARKS
Environmental	Vibration (Sinusoidal)	IEC60068-2-6	Ruggedized version test parameters: <ul style="list-style-type: none"> • 10-300 (Hz) frequency range • 5 (g) acceleration • 1 (oct/min) sweep rate • 10 cycles/axis • 3 axis
	Single Shock	IEC60068-2-27	Ruggedized version test parameters: <ul style="list-style-type: none"> • 30 (g) acceleration • 9 (ms) shock duration half sine • 3 number of shocks per direction (total: 18) • 6 directions • 5 (s) recovery time
	Permanent Shock	IEC60068-2-29	Ruggedized version test parameters: <ul style="list-style-type: none"> • 15 (g) acceleration • 11 (ms) shock duration half sine • 500 number of shocks per direction • 6 directions • 5 (s) recovery time

Furthermore, boards providing ruggedized service and conformal coating comply with the following standards as well.

Table 1-4: Add. Standards for CP3002 with Rug. Service and Conformal Coating

TYPE	ASPECT	STANDARD	REMARKS
Environmental	Random Vibration (Broadband)	VITA 47, Class V1	Test parameters: 5-100 (Hz) frequency range 0.04 (g ² /Hz) acceleration 60 min//axis test duration 3 axes
	Single Shock	VITA 47, Class OS1	Test parameters: 20 (g) acceleration 11 (ms) half-sine shock duration 3 number of shocks per direction (total: 18) 6 directions 5 (s) recovery time
	Temperature	VITA 47, Class AC3	Test parameters: -20°C to +70°C operating temperature forced airflow 3 m/s Above +65°C, the CPU performance may be reduced, depending on application demands and system cooling capabilities.
		VITA 47, Class C4	Test parameters: -55°C to +105°C storage temperature
	Climatic Humidity	VITA 47	Test parameters: 30°C to 60°C, 10*24h cyclic temperature 95% RH



Note ...

When additional modules are used with a ruggedized and coated CP3002, please refer to the specifications of the respective module as this may have an impact on the environmental conditions of the board.



1.7 Related Publications

The following publications contain information relating to this product.

Table 1-5: Related Publications

PRODUCT	PUBLICATION
CompactPCI Systems	CompactPCI Specification PICMG 2.0, Rev. 3.0 CompactPCI Hot Swap Specification PICMG 2.1 Rev. 2.0
Serial ATA	Serial ATA 1.0a Specification
CFast	CFast Specification Revision 1.0
Platform Firmware	Unified Extensible Firmware Interface (UEFI) specification, version 2.1
All Kontron products	Product Safety and Implementation Guide, ID 1021-9142