» User Guide «

CP6004-RA / CP6004-RC

Rugged 6U CompactPCI Processor Board based on the 3rd Generation Intel® Core™ i7 Processor with the Intel® QM77 Express Chipset

Doc. ID: 1055-1509, Rev. 1.0
August 13, 2013

Revision History

Publication Title:	CP6004-RA/CP6004-RC: Rugged 6U CompactPCI Processor Board based on the 3rd Generation Intel® Core™ i7 Processor with the Intel® QM77 Express Chipset
Doc. ID:	1055-1509

Rev.	Brief Description of Changes	Date of Issue
1.0	Initial issue	13-Aug-2013

Imprint

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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!

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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!

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

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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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Kontron grants the original purchaser of Kontron's products a ***TWO YEAR LIMITED HARDWARE WARRANTY*** as described in the following. However, no other warranties that may be granted or implied by anyone on behalf of Kontron are valid unless the consumer has the express written consent of Kontron.

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Chapter 1

Introduction

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1. Introduction

1.1 Board Overview

The CP6004-RA (Rugged Air-Cooled) / CP6004-RC (Rugged Conductive-Cooled) is a highly integrated 6U CompactPCI system controller board based on the 3rd generation Intel® Core™ i7 processor combined with the mobile Intel® QM77 Express Chipset.

The board supports the 3rd generation, Intel® Core™ i7-3612QE quad-core processor with 2.1 GHz and the Intel® Core™ i7-3555LE dual-core processor with 2.5 GHz. All processors are built on 22-nm technology and provided in a BGA package.

The CP6004-RA/-RC includes up to 16 GB dual-channel DDR3 soldered memory with Error Checking and Correction (ECC) running at 1600 MHz. Furthermore, up to 64 GB NAND flash memory (SSD) via a SATA Flash module can be integrated into the CP6004-RA/-RC.

The CP6004-RA has a front panel and comes with various interfaces such as up to five Gigabit Ethernet ports (three on front I/O and up to four on rear I/O in compliance with PICMG 2.16), four high-resolution graphics interfaces (DisplayPort, VGA, 2 x HDMI/DVI), two COM ports (RS-232 on front and rear I/O, RS-422/RS-232 on rear I/O), and five SATA interfaces with RAID 0/1/5/10 functionality, one for the SATA Flash module and four for rear I/O. In addition, six USB 2.0 ports, two on front I/O and four on rear I/O as well as four general purpose inputs (GPI) and four general purpose outputs (GPO) are available on the board. The CP6004-RA provides support for one standard PMC/XMC module either via one 64-bit/66 MHz PCI or 64-bit/133 MHz PCI-X PMC interface or via one XMC interface utilizing a x8 lane PCI Express 2.0 interconnection.

The CP6004-RC has no front panel and provides various interfaces such as four Gigabit Ethernet ports on rear I/O in compliance with PICMG 2.16, three high-resolution graphics interfaces (VGA, 2 x HDMI/DVI), two COM ports (RS-232 and RS-422/RS-232 on rear I/O), and five SATA interfaces with RAID 0/1/5/10 functionality, one for the SATA Flash module and four for rear I/O. In addition, four USB 2.0 ports on rear I/O as well as four general purpose inputs (GPI) and four general purpose outputs (GPO) are available on the board. The CP6004-RC provides support for one conduction-cooled PMC (CCPMC)/one conduction-cooled XMC either via one 64-bit/66 MHz PCI or 64-bit/133 MHz PCI-X PMC interface or via one XMC interface utilizing a x8 lane PCI Express 2.0 interconnection.

The CP6004-RA/-RC supports a configurable 64-bit/66 MHz PCI or PCI-X hot swap CompactPCI interface. When installed in the system slot, the interface is enabled, and when installed in a peripheral slot, the CP6004-RA/-RC is isolated from the CompactPCI bus. Safety and security features via a Trusted Platform Module (TPM) 1.2 are provided on request. Intelligent Platform Management Interface (IPMI) is supported as well.

The CP6004-RA/-RC has an extended operating temperature range and is ruggedized for high shock and vibration environments. The CP6004-RA provides a heat sink optimized for air cooling. The CP6004-RC provides a heat spreader extending across the whole board to enable the heat to be conducted from the board to the chassis. On the CP6004-RC two wedge locks are available for mounting the board in the chassis.

Designed for stability, the board fits into 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 with high temperature tolerance have been selected from embedded technology programs, and therefore offer long-term availability. The board is offered with various Board Support Packages including Windows, VxWorks and Linux operating systems. For further information concerning the operating systems available for the CP6004-RA/-RC, please contact Kontron.

1.2 CP6004-RA Board-Specific Information

The CP6004-RA is a rugged air-cooled CompactPCI single-board computer with front I/O. It is based on the 3rd generation Intel® Core™ i7 processor and specifically designed for use in highly integrated platforms with solid mechanical interfacing for a wide range of industrial environment applications.

- Support for the following 3rd generation processors:
  - Intel® Core™ i7-3612QE (SV) quad-core processor, 2.1 GHz, 6 MB L3 cache
  - Intel® Core™ i7-3555LE (LV) dual-core processor, 2.5 GHz, 4 MB L3 cache
- Intel® QM77 Express Chipset
- Up to 16 GB, dual-channel, soldered DDR3 SDRAM memory with ECC running at 1600 MHz
- Integrated 3D high-performance graphics controller with up to four high-resolution graphics interfaces (VGA / DP / 2 x HDMI/DVI)
- 64-bit/66 MHz PCI or PCI-X CompactPCI interface (PICMG 2.0)
- One PMC slot with PCI functionality and rear I/O support; 64-bit/66 MHz PCI interface or 64-bit/133 MHz PCI-X interface
- One XMC slot utilizing a x8 lane PCI Express 2.0 interconnection
- Five Gigabit Ethernet interfaces:
  - Two Gigabit Ethernet interfaces switchable between front I/O and rear I/O
  - Two Gigabit Ethernet interfaces on rear I/O (PICMG 2.16)
  - One Gigabit Ethernet interface on front I/O
- Two Gigabit Ethernet (GbE) controllers:
  - One Intel® 82579LM Gigabit Ethernet controller connected to one GbE port on the front panel
  - One Intel® 82580EB Quad Gigabit Ethernet controller connected to two GbE ports on the front panel and two GbE ports on the rear I/O
- Five Serial ATA interfaces with SATA RAID 0/1/5/10 support:
  - One onboard SATA 6 Gb/s interface for the Serial ATA Flash module
  - Four SATA 3 Gb/s interfaces on the rear I/O
- Six USB ports:
  - Two USB 2.0 ports on the front panel
  - Four USB 2.0 ports on the rear I/O
- Two COM ports:
  - One RS-232 COM port either on the front panel or on the rear I/O (COMA)
  - One RS-422/RS-232 COM port on the rear I/O (COMB)
- TCG 1.2 compliant Trusted Platform Module (TPM), on request
- Two SPI boot flashes:
  - One standard SPI boot flash
  - One recovery SPI boot flash
- Four general purpose inputs (GPI) and four general purpose outputs (GPO) on rear I/O
- Watchdog timer
- Battery-backed real-time clock
- Three onboard DIP switches for board configuration
- Supports PICMG Packet Switching Backplane Specification 2.16
- IPMI support
- 4HP, 6U CompactPCI
- Passive heat sink solution for forced airflow cooling
- Rear I/O on J3, J4 and J5
- Hot swap capability: as system controller or as peripheral device
- AMI Aptio®, a uEFI-compliant platform firmware

1.3 CP6004-RC Board-Specific Information

The CP6004-RC is a rugged conductive-cooled CompactPCI single-board computer without front I/O. It is based on the 3rd generation Intel® Core™ i7 processor and specifically designed for use in highly integrated platforms with solid mechanical interfacing for a wide range of industrial environment applications.

- Support for the following 3rd generation processors:
  - Intel® Core™ i7-3612QE (SV) quad-core processor, 2.1 GHz, 6 MB L3 cache
  - Intel® Core™ i7-3555LE (LV) dual-core processor, 2.5 GHz, 4 MB L3 cache
- Intel® QM77 Express Chipset
- Up to 16 GB, dual-channel, soldered DDR3 SDRAM memory with ECC running at 1600 MHz
- Integrated 3D high-performance graphics controller with up to three high-resolution graphics interfaces (VGA / 2 x HDMI/DVI)
- 64-bit/66 MHz PCI or PCI-X CompactPCI interface (PICMG 2.0)
- One conductive-cooled PMC slot with PCI functionality and rear I/O support; 64-bit/66 MHz PCI interface or 64-bit/133 MHz PCI-X interface
- One conductive-cooled XMC slot utilizing a x8 lane PCI Express 2.0 interconnection
- Four Gigabit Ethernet interfaces:
  - Two Gigabit Ethernet interfaces on rear I/O with disable option in uEFI BIOS
  - Two Gigabit Ethernet interfaces on rear I/O (PICMG 2.16)
- One Gigabit Ethernet controller:
  - One Intel® 82580EB Quad Gigabit Ethernet controller connected to the Gigabit Ethernet ports on the rear I/O
- Five Serial ATA interfaces with SATA RAID 0/1/5/10 support:
  - One onboard SATA 6 Gb/s interface for the Serial ATA Flash module
  - Four SATA 3 Gb/s interfaces on the rear I/O
- Four USB ports on the rear I/O
- Two COM ports:
  - One RS-232 COM port on the rear I/O (COMA)
  - One RS-422/RS-232 COM port on the rear I/O (COMB)
- TCG 1.2 compliant Trusted Platform Module (TPM), on request
- Two SPI boot flashes:
  - One standard SPI boot flash
  - One recovery SPI boot flash
- Four general purpose inputs (GPI) and four general purpose outputs (GPO) on rear I/O
- Watchdog timer
- Supports PICMG Packet Switching Backplane Specification 2.16
- IPMI support
- 4HP, 6U CompactPCI
- Passive heat sind solution for conductive-cooling
- Rear I/O on J3, J4 and J5
- AMI Aptio®, a uEFI-compliant platform firmware

1.4 System Expansion Capabilities

1.4.1 PMC/XMC Module (CP6004-RA)

The CP6004-RA has a 3.3V, rear I/O capable PMC mezzanine interface configurable for either 64-bit/66 MHz PCI or 64-bit/133 MHz PCI-X operation with support for PMC modules. For information on the PMC interface, refer to chapter 2.9.10, "PMC Interface".

The CP6004-RA has one XMC mezzanine interface for support of x1, x4 and x8 PCI Express 2.0 XMC modules. For information on the XMC interface, refer to chapter 2.9.11, "XMC Interface".

1.4.2 Conductive-Cooled PMC/XMC Module (CP6004-RC)

The CP6004-RC has a 3.3V, rear I/O capable PMC mezzanine interface configurable for either 64-bit/66 MHz PCI or 64-bit/133 MHz PCI-X operation with support for conductive-cooled PMC (CCPMC) modules. For information on the PMC interface, refer to chapter 2.9.10, "PMC Interface".

The CP6004-RC has one XMC mezzanine interface for support of x1, x4 and x8 PCI Express 2.0 conductive-cooled XMC modules. For information on the XMC interface, refer to chapter 2.9.11, "XMC Interface".

1.4.3 SATA Flash Module

The CP6004-RA/-RC provides support for up to 64 GB NAND flash memory in combination with an optional SATA Flash module, which is connected to the CP6004-RA/-RC via an on-board SATA extension connector. For further information concerning the SATA Flash module, please refer to Appendix A.

1.4.4 Rear I/O Module

The CP6004-RA/-RC provides support for one rear I/O module via the CompactPCI rear I/O connectors. For further information about the compatibility of rear I/O modules with the CP6004-RA/-RC, please refer to the CP6004-RA/-RC datasheet.

1.5 Version Comparison

Table 1-1: Version Comparison

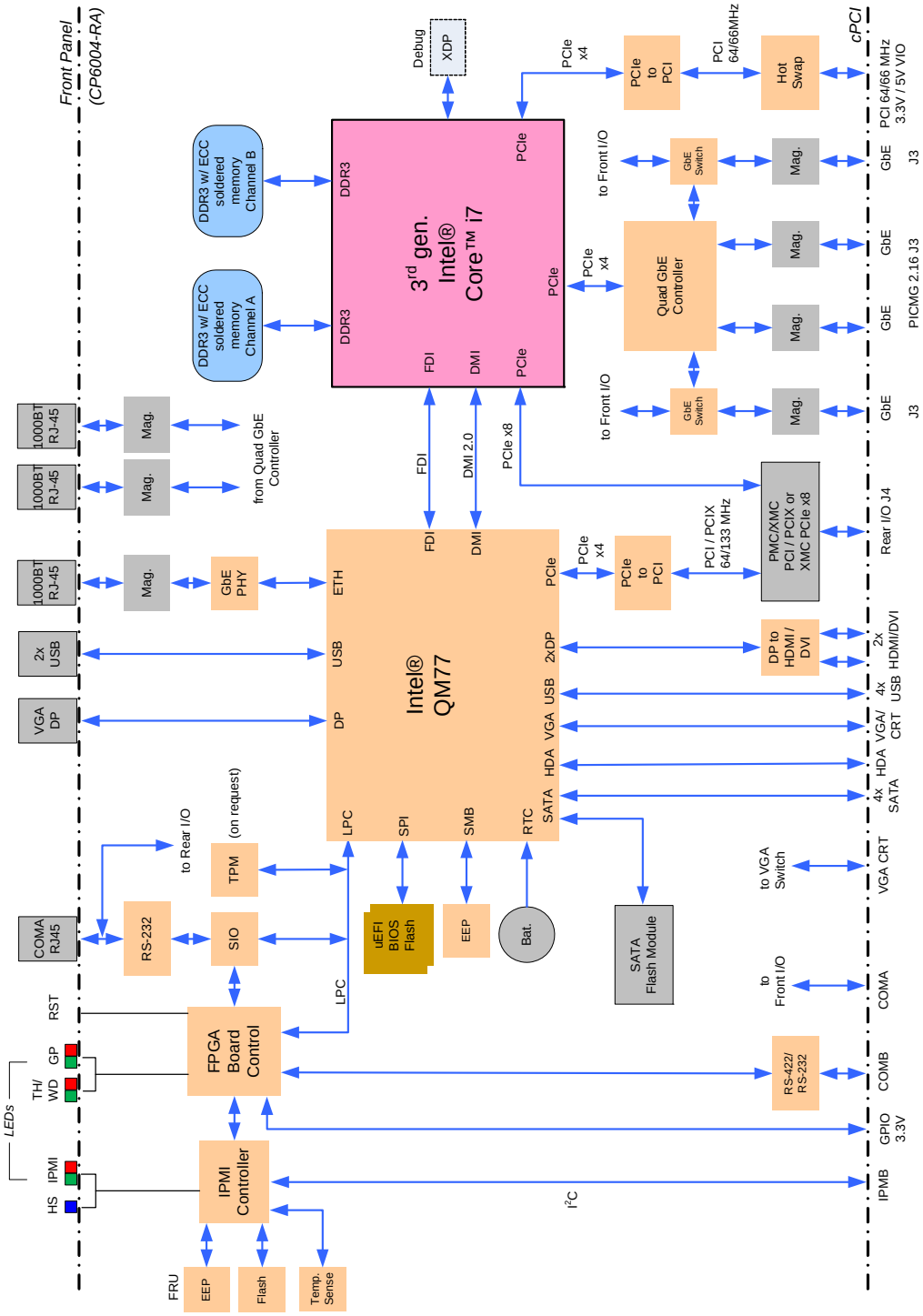
FEATURE	CP6004-RA	CP6004-RC
Heat sink	Air-cooled heat sink	Conductive-cooled heat sink
PMC/XMC	Standard PMC/XMC	Conductive-cooled PMC/XMC
Front Ethernet port	Up to 3 GbE ports	--
Rear Ethernet port	Up to four GbE ports	Up to four GbE ports
Front DisplayPort	1	--
Front COM port (RS-232)	1	--
Front LEDs	4	--
Cooling	Convection	Conduction

1.6 Board Diagrams

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

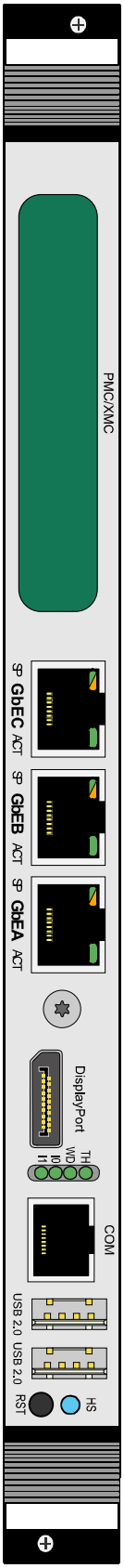
1.6.1 Functional Block Diagram

Figure 1-1: CP6004-RA/-RC Functional Block Diagram



1.6.2 Front Panel

Figure 1-2: CP6004-RA Front Panel



Legend:

IPMI LEDs

I0/I1 (red/green): Indicate the software status of the IPMI controller

Status LEDs

WD (green): Watchdog Status

TH (red/green): Temperature Status

HS (blue): Hot Swap Control

Integral Ethernet LEDs

ACT (green): Ethernet Link/Activity

SPEED (green/orange/off): Ethernet Speed

1.6.3 Board Layout

Figure 1-3: CP6004-RA Board Layout – Top View

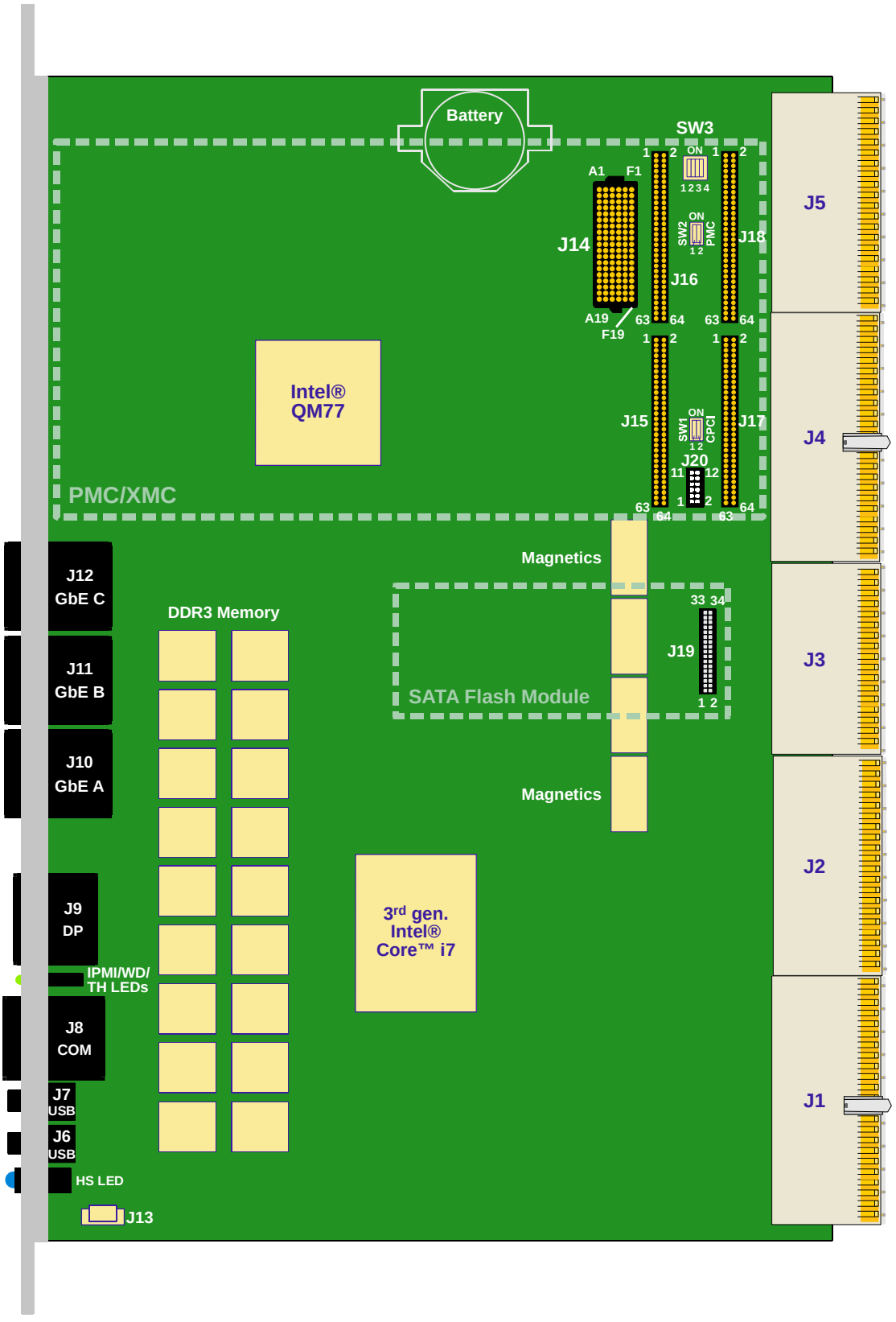


Figure 1-4: CP6004-RC Board Layout – Top View

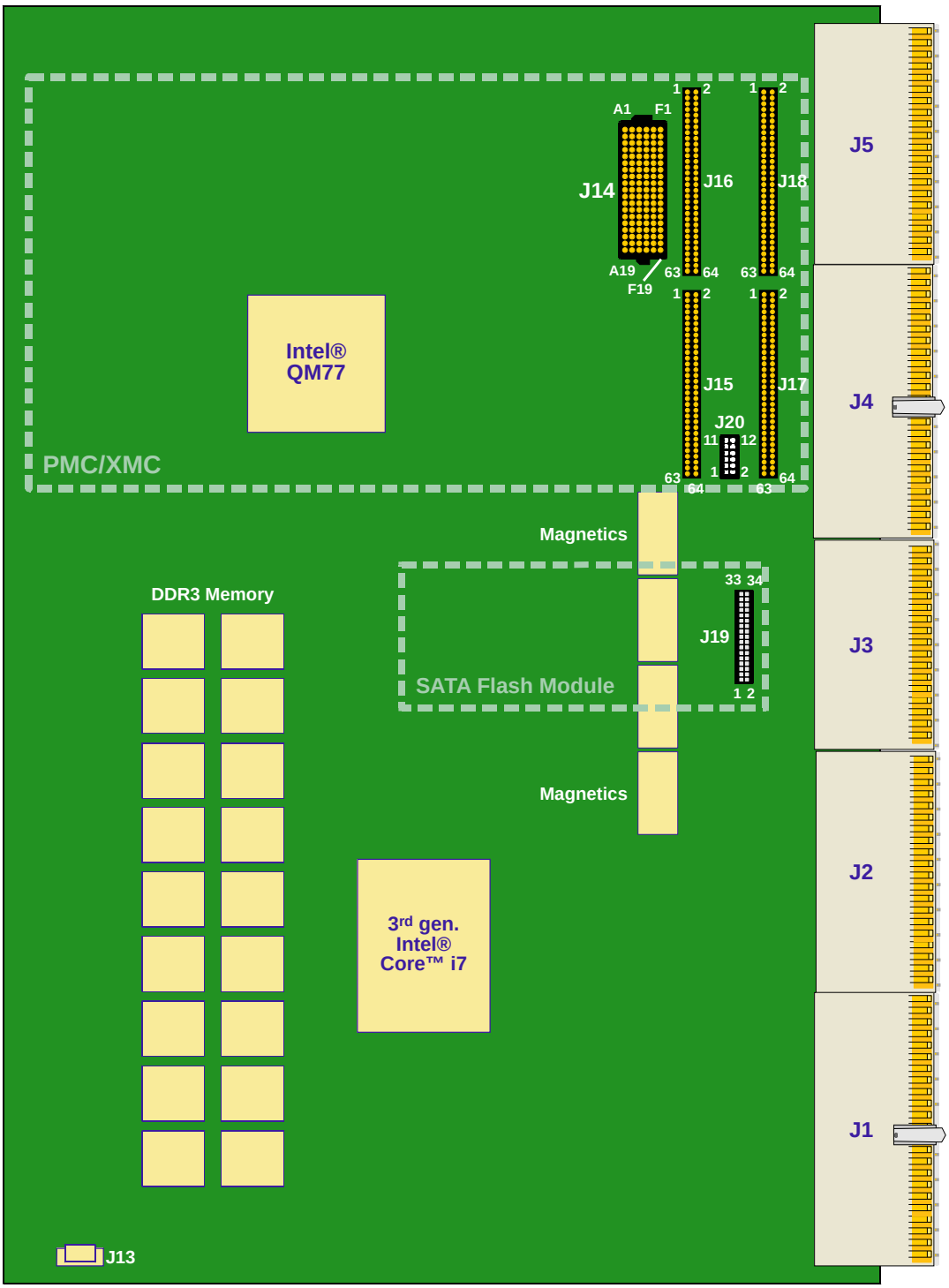


Figure 1-5: CP6004-RA Board Layout – Bottom View

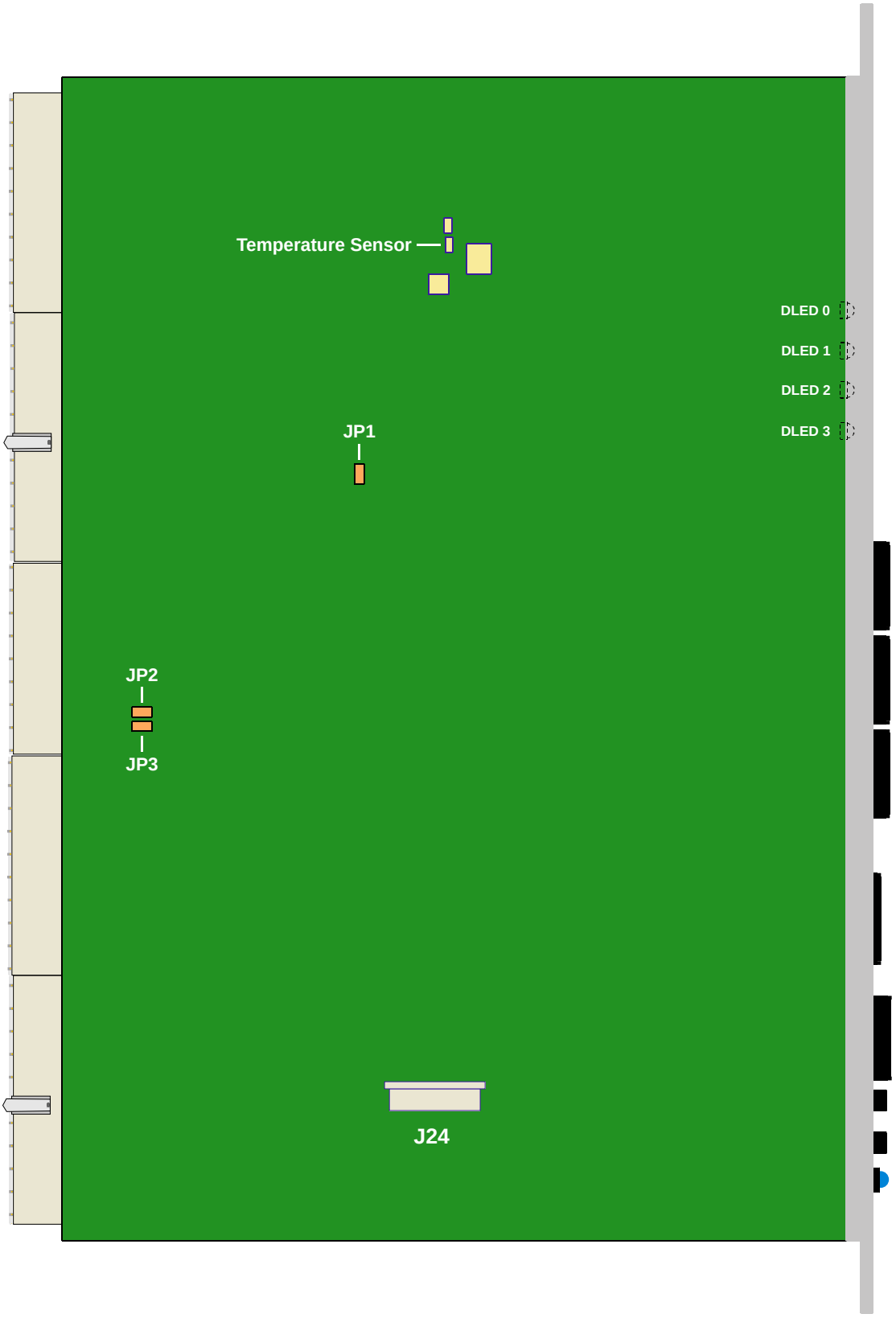
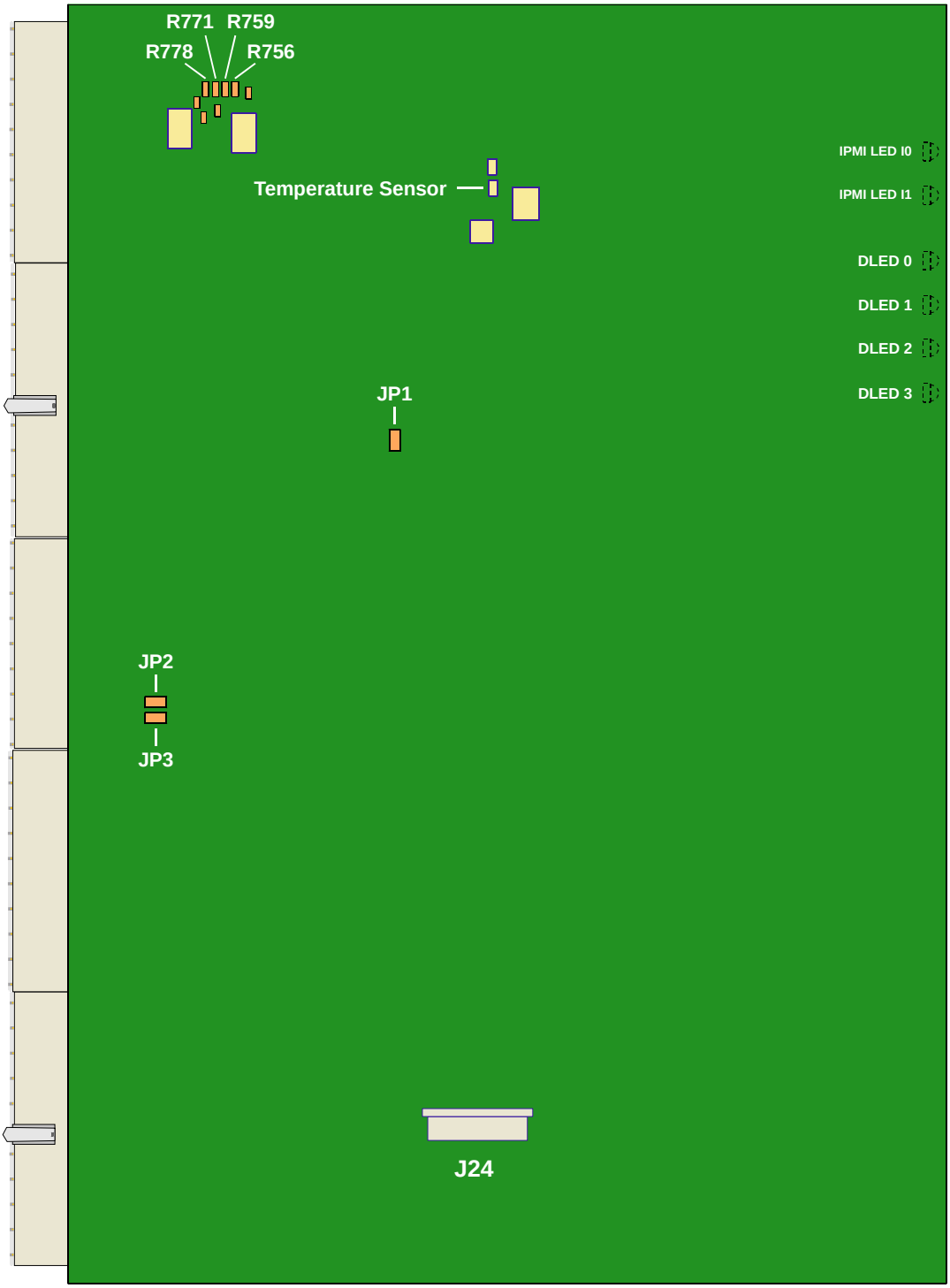


Figure 1-6: CP6004-RC Board Layout – Bottom View



1.7 Technical Specification

Table 1-2: CP6004-RA/-RC Main Specifications

FEATURES		SPECIFICATIONS
Processor and Memory	CPU	The CP6004-RA/-RC supports the following 3rd generation microprocessors: • Intel® Core™ i7-3612QE (SV) quad-core processor, 2.1 GHz, 6 MB L3 cache • Intel® Core™ i7-3555LE (LV) dual-core processor, 2.5 GHz, 4 MB L3 cache Further processor features: • Up to four execution cores • Intel® Hyper-Threading Technology (Intel® HT Technology) • Intel® 64 Architecture • Intel® Advanced Vector Extensions (AVX) floating point • Intel® Turbo Boost Technology 2.0 • Intel® Intelligent Power Sharing (IPS) • System memory interface with optimized support for dual-channel DDR3 SDRAM memory at 1600 MHz with ECC • Integrated 2D and 3D Graphics Engines • DMI 2.0 with 5 GT/s and FDI interfaces to the Intel® QM77 Chipset • One x8 and two x4 PCI Express 2.0 ports operating at 5 GT/s Please contact Kontron for further information concerning the suitability of other Intel processors for use with the CP6004-RA/-RC.

	Memory	Main Memory:
		• Up to 16 GB, dual-channel, soldered DDR3 SDRAM memory with ECC running at 1600 MHz
		Cache Structure:
		• 64 kB L1 cache for each core
		  • 32 kB instruction cache
		  • 32 kB data cache
		• 256 kB L2 shared instruction/data cache for each core
		• Up to 6 MB L3 shared instruction/data cache
		Flash Memory:
		• Two SPI flashes (2 x 8 MB) for uEFI BIOS and controlled by the IPMI controller
		• Up to 64 GB NAND flash via an onboard Serial ATA Flash module (SSD)
		Serial EEPROM with 64 kbit

Table 1-2: CP6004-RA/-RC Main Specifications (Continued)

FEATURES		SPECIFICATIONS

Chipset	Intel® QM77	Mobile Intel® QM77 Express Chipset:
		• Two x4 or eight x1 PCI Express 2.0 ports operating at 5 GT/s (only one x4 PCI Express port is used on the CP6004-RA/-RC)
		• SATA host controller with five ports and RAID 0/1/5/10 support
		  • One SATA 6 Gb/s ports accessible via an onboard connector
		  • Four SATA 3 Gb/s ports accessible via rear I/O
		• USB 2.0 host interface with up to 14 USB ports available (only six ports are used on the CP6004-RA/-RC)
		• USB 3.0 host interface with up to 4 USB ports available (not used on the CP6004-RA/-RC)
		• Integrated Ethernet controller
		• SPI flash interface support
		• Low Pin Count (LPC) interface
		• Power management logic support
		• Enhanced DMA controller, interrupt controller, and timer functions
		• System Management Bus (SMBus) compatible with most I²C™ devices
		• DMI 2.0 with 5 GT/s and FDI interfaces to the processor
		• High Definition Audio (HDA) interface
		• Analog display port
		• Three digital display ports
		• Integrated RTC

Integrated Controller	Graphics controller	High-performance 3D graphics controller integrated in the processor: • Support for two independent displays • Supports analog displays (CRT) up to a resolution of 2048 x 1536 pixels with 32-bit color @ 75 Hz • Supports digital displays (HDMI/DVI) up to a resolution of 1920 x 1200 pixels @ 60 Hz • Supports digital display (DP) up to a resolution of 2560 x 1600 pixels @ 60 Hz • Dynamic Video Memory Technology (DVMT)
Interfaces	CompactPCI	Compliant with the CompactPCI Specification PICMG 2.0 R 3.0: • System controller operation • 64-bit/66 MHz PCI or PCI-X master interface with dedicated PCIe-to-PCI-X bridge • 3.3V or 5V signaling levels (universal signaling support) Compliant with the Packet Switching Specification PICMG 2.16. The CP6004-RA/-RC supports System Master hot swap functionality and application-dependent hot swap functionality when used in a peripheral slot. When used as a System Master, the CP6004-RA/-RC supports individual clocks for each slot and the ENUM signal handling is in compliance with the PICMG 2.1 Hot Swap Specification. When installed in a peripheral slot, the CP6004-RA/-RC is isolated from the CompactPCI bus. It receives power from the backplane and supports rear I/O and, if the system supports it, packet switching (in this case up to two channels of Gigabit Ethernet).

Table 1-2: CP6004-RA/-RC Main Specifications (Continued)

FEATURES		SPECIFICATIONS
Interfaces	Rear I/O	The following interfaces are routed to the rear I/O connectors J3 and J5. • COMA (RS-232 signaling) and COMB (RS-422/RS-232 signaling); no buffer on the rear I/O module is necessary • 4 x USB 2.0 • 1 x CRT VGA, 2 x HDMI/DVI • 1 x HDA • 2 x Gigabit Ethernet (compliant with PICMG 2.16, R 1.0) • 2 x Gigabit Ethernet • 4 x SATA 3 Gb/s • 4 x GPIs and 4 x GPOs (LVTTL signaling) The rear I/O connector J4 provides rear I/O interconnection to the PMC/XMC interface.
	Gigabit Ethernet	Up to five 10 Base-T/100 Base-TX/1000 Base-T Gigabit Ethernet interfaces based on one Intel® 82579LM Gigabit Ethernet controller and one Intel® 82580EB Quad Gigabit Ethernet controller: • Three RJ-45 connectors on the front panel (CP6004-RA) • Two ports switchable between front I/O and to rear I/O (CP6004-RA) • Two Gigabit Ethernet interfaces on rear I/O with disable option in uEFI BIOS (CP6004-RC) • Two ports on the rear I/O (PICMG 2.16) • Automatic mode recognition (Auto-Negotiation) • Automatic cabling configuration recognition (Auto-MDI/X)
	USB	Up to six USB ports supporting UHCI (USB 1.1) and EHCI (USB 2.0): • Two type A USB 2.0 connectors on the front panel (CP6004-RA) • Four USB 2.0 ports on the rear I/O interface
	Serial	The CP6004-RA provides two 16C550-compatible UARTs : • One RS-232 port either on the front panel or on the rear I/O, COMA • One RS-422/RS-232 port on the rear I/O, COMB The CP6004-RC provides two 16C550-compatible UARTs : • One RS-232 port on the rear I/O, COMA • One RS-422/RS-232 port on the rear I/O, COMB
	PMC	PMC interface: • Four onboard mezzanine connectors, (Jn1-Jn4), for connecting a PMC module • Up to 64-bit/66 MHz PCI or up to 64-bit/133 MHz PCI-X interface with dedicated PCIe-to-PCI-X bridge • Only 3.3V PCI signaling voltage • Rear I/O supported through the CompactPCI connector J4 • Supported voltages: 3.3 V, 5 V, +12 V, and -12 V • Support for PMC modules (CP6004-RA) • Support for CCPMC modules (CP6004-RC)
	XMC	XMC interface: • One onboard XMC connector (P15) • Up to x8 lanes PCI Express 2.0 ports operating at 5 GT/s • Rear I/O supported through the PMC connector (Jn4) to the CompactPCI connector J4 • Support for XMC modules (CP6004-RA) • Support for conductive-cooled XMC modules (CP6004-RC)

Table 1-2: CP6004-RA/-RC Main Specifications (Continued)

	FEATURES	SPECIFICATIONS
Interfaces	Serial ATA	One Serial ATA 6 Gb/s interfaces for: • One onboard SATA 6 Gb/s interface for the Serial ATA Flash module (up to 64 GB flash memory) Four SATA 3 Gb/s ports accessible via rear I/O
Sockets	Front Panel Connectors (CP6004-RA)	• DP: one 20-pin DisplayPort connector, J9 • USB: two 4-pin, type A connectors, J6 and J7 • Ethernet: three 8-pin, RJ-45 connectors, J10, J11 and J12 • Serial port: one 8-pin, RJ-45 connector, J8 (COMA) • PMC/XMC front panel bezel cutout
	Onboard Connectors	• PMC connectors J15 - J18 (Jn1 - Jn4) • XMC connector, J14 • One 34-pin, SATA extension connector, J19 • JTAG connector, J20 • Debug connector, J22 • XDP-SFF (debug) connector, J24 • CompactPCI Connectors J1 - J5
Switches	DIP Switches (CP6004-RA)	Three onboard DIP switches, SW1, SW2, and SW3, for board configuration
	Reset Switch (CP6004-RA)	One front panel hardware reset switch
	Hot Swap Switch (CP6004-RA)	One switch for hot swap purposes integrated in the front panel handle in accordance with PICMG 2.1 Rev. 2.0.
LEDs	System LEDs	System Status LEDs on the CP6004-RA: • I0/I1 (red/green): Indicate the software status of the IPMI controller • WD (green): Watchdog Status • TH (red/green): Temperature Status • HS (blue): Hot Swap Control System Status LEDs on the CP6004-RC: • I0/I1 (red/green): Indicate the software status of the IPMI controller (located on the rear side of the board) Debug LEDs (CP6004-RA/-RC): • DLED0-3 (red/green): Onboard LEDs for debugging purposes (located on the rear side of the board)
	Ethernet LEDs (CP6004-RA)	Gigabit Ethernet Status: • ACT (green): Ethernet Link/Activity • SPEED (green/orange/off): Ethernet Speed

Table 1-2: CP6004-RA/-RC Main Specifications (Continued)

FEATURES		SPECIFICATIONS
Timer	Watchdog Timer	• 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	• The Intel® QM77 Chipset contains three 8254-style counters which have fixed uses • In addition to the three 8254-style counters, the Intel® QM77 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.
IPMI	IPMI Controller	• NXP® ARM7 microcontroller with redundant 512 kB firmware flash and automatic roll-back strategy • The IPMI controller carries out IPMI commands such as monitoring several onboard temperature conditions, board voltages and the power supply status, and managing hot swap operations. • The IPMI controller is accessible via two IPMBs (through the J1 and J2 connectors) and one host Keyboard Controller Style (KCS) interface.

Thermal	Thermal Management	CPU and board overtemperature protection is provided by:
		• Temperature sensors integrated in the 3rd generation Intel® Core™ i7 processor:
		  • One temperature sensor for monitoring each processor core
		  • One temperature sensor for monitoring the graphics core
		  • One temperature sensor for monitoring the package die temperature
		• One temperature sensor integrated in the Intel® QM77 Chipset for monitoring the chipset
		• One onboard temperature sensor for monitoring the board temperature
		• Specially designed heat sink

Security	TPM	Trusted Platform Module (TPM) 1.2 for enhanced hardware- and software-based data and system security (on request)

Table 1-2: CP6004-RA/-RC Main Specifications (Continued)

	FEATURES	SPECIFICATIONS
Software	uEFI BIOS	AMI Aptio®, AMI's next-generation BIOS firmware based on the uEFI Specification and the Intel Platform Innovation Framework for EFI. • LAN boot capability for diskless systems (standard PXE) • 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 • uEFI Shell commands executable from mass storage device in a Pre-OS environment (open interface) • IPMI support in the command shell
	Software IPMI	IPMI firmware providing the following features: • The IPMI controller is accessible via up to two IPMBs, IOL and one KCS interface with interrupt support • The IPMI firmware can be updated in field through all supported interfaces using the function "fwum..." of the open-source tool "ipmitool". For further information on the ipmitool refer to the sourceforge.net website. • Two IPMI controller flash banks with automatic roll-back capability in case of an upgrade firmware failure • Board supervision and control extensions such as board reset, power and SPI flash control, etc.
	Operating Systems	The board is offered with various Board Support Packages including Windows, VxWorks and Linux operating systems. For further information concerning the operating systems available for the CP6004-RA/-RC, please contact Kontron.

Table 1-2: CP6004-RA/-RC Main Specifications (Continued)

FEATURES		SPECIFICATIONS
General	Mechanical	6U, 4HP, CompactPCI-compliant form factor
	Power Consumption	See Chapter 5 for details.
	Temperature Ranges	Operational temperature of CP6004-RA without TPM (with forced airflow): • CP6004-RA with Core™ i7-3612QE (SV): -40°C to +70°C • CP6004-RA with Core™ i7-3555LE (LV): -40°C to +70°C Operational temperature of CP6004-RC without TPM: • Card edge temperature of CP6004-RC with Core™ i7-3612QE (SV) at the maximum frequency of 2.1 GHz: -40°C to + 75°C • Card edge temperature of CP6004-RC with Core™ i7-3612QE (SV) at a reduced frequency of 1.5 GHz: -40°C to + 85°C • Card edge temperature of CP6004-RC with Core™ i7-3555LE (LV) at the maximum frequency of 2.5 GHz: -40°C to + 70°C • Card edge temperature of CP6004-RC with Core™ i7-3555LE (LV) at a reduced frequency of 1.8 GHz: -40°C to + 80°C Operational temperature of TPM: -25°C to +70°C Storage temperature of CP6004-RA without hard disk and without battery: -40°C to +85°C Storage temperature of CP6004-RC without hard disk and without battery: -55°C to +105°C  *Note ...* When a battery is installed, refer to the operational specifications of the battery as this determines the storage temperature of the CP6004-RA (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 CP6004-RA/-RC.
	Battery (CP6004-RA)	3.0V lithium battery for RTC with battery socket. Battery type: UL-approved CR2025 Temperature ranges: Operational: -20°C to +70°C typical (refer to the battery manufacturer's specifications for exact range) Storage: -55°C to +70°C typical (no discharge)
	Dimensions	233.35 mm x 160 mm
	Board Weight	CP6004-RA: 725 g (with heat sink but without mezzanine cards) CP6004-RC: 828 g (with heat sink but without mezzanine cards)

1.8 Standards

The CP6004-RA/-RC complies with the requirements of the following standards:

Table 1-3: Standards for the CP6004-RA

TYPE	ASPECT	STANDARD	REMARKS
CE	Emission	EN55022 EN61000-6-3	--
	Immission	EN55024 EN61000-6-2	--
	Electrical Safety	EN60950-1	--
Mechanical	Mechanical Dimensions	IEEE1101.10	--
Environmental	Climatic Humidity	IEC60068-2-78	93% RH at 40°C, non-condensing See note below.
	WEEE	Directive 2002/96/EC	Waste electrical and electronic equipment
	RoHS 2	Directive 2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment
	Random Vibration (Broadband)	ANSI/VITA 47 (Class V2)	Test parameters: • 5-100 (Hz) frequency range: +3dB slope • 100-1000 (Hz) freq. range: 0.04 (g^2/Hz) • 1000-2000 (Hz) freq. range: -6dB slope • 7.619 g (rms) • 60 (min) test duration/axis • 3 axes
	Single Shock	ANSI/VITA 47 (Class OS1)	Test parameters: • 20 (g) acceleration • 11 (ms) shock duration half sine • 3 shocks per direction • 6 directions • 5 (s) recovery time

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.

Table 1-4: Standards for the CP6004-RC

TYPE	ASPECT	STANDARD	REMARKS
CE	Emission	EN55022 EN61000-6-3	--
	Immission	EN55024 EN61000-6-2	--
	Electrical Safety	EN60950-1	--
Mechanical	Mechanical Dimensions	ANSI/VITA 30.1	--
Environmental	Climatic Humidity	ANSI/VITA 47	95% RH at +30°C to +60°C, condensing
	WEEE	Directive 2002/96/EC	Waste electrical and electronic equipment
	RoHS 2	Directive 2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment
	Random Vibration (Broadband)	ANSI/VITA 47 (Class V3)	Test parameters: • 5-100 (Hz) frequency range: +3dB slope • 100-1000 (Hz) freq. range: 0.1 (g^2/Hz) • 1000-2000 (Hz) freq. range: -6dB slope • 12.05 g (rms) • 60 (min) test duration/axis • 3 axes
	Single Shock	ANSI/VITA 47 (Class OS2)	Test parameters: • 40 (g) acceleration • 11 (ms) shock duration half sine • 3 shocks per direction • 6 directions • 5 (s) recovery time

1.9 Related Publications

The following publications contain information relating to this product.

Table 1-5: Related Publications

PRODUCT	PUBLICATION
CompactPCI Systems and Boards	CompactPCI Specification PICMG 2.0, Rev. 3.0 CompactPCI Packet Switching Backplane Specification PICMG 2.16 Rev. 1.0 CompactPCI System Management Specification PICMG 2.9 Rev. 1.0 CompactPCI Hot Swap Specification PICMG 2.1 Rev. 2.0
	IPMI - Intelligent Platform Management Interface Specification v2.0
	Kontron CompactPCI Backplane Manual, ID 24229
PMC Module	IEEE 1386-2001, IEEE Standard for a Common Mezzanine Card (CMC) Family IEEE 1386.1-2001, IEEE Standard Physical and Environmental Layers for PCI Mezzanine Cards (PMC)
XMC Module	ANSI/VITA 42.0-200x XMC Switched Mezzanine Card Auxiliary Standard ANSI/VITA 42.3-2006 XMC PCI Express Protocol Layer Standard
Platform Firmware	Unified Extensible Firmware Interface (uEFI) Specification, Version 2.1
All Kontron products	Product Safety and Implementation Guide, ID 1021-9142
Kontron	CP6004-RA/-RC uEFI BIOS User Guide
	CP6004-RA/-RC IPMI Firmware User Guide