3rd Gen. Intel® Core™ 3U CompactPCI CPU Board

» **High-Performance CPU**
  Latest Intel® Core™ technology, quad- and dual-core processors

» **High-End Graphics**
  3x independent outputs, DirectX® 11, OpenCL 1.1, OpenGL 3.1

» **High-Speed Connectivity**
  USB 3.0, SATA 6 Gb/s and PCI Express
**CP3003-SA**

3rd Generation Intel® Core™ 3U CompactPCI CPU Board

Intel®’s new 3rd Generation Core™ technology brings an unprecedented combination of highest performance and new power-saving capabilities to the embedded market. Making use of this latest technology the CP3003-SA is able to offer a new range of performance and power consumption scalability. On the one hand the CP3003-SA provides utmost performance with a quad-core CPU option, on the other hand the option to dynamically adjust the processor’s TDP to a desired performance and power envelope through new CPU features such as Configurable TDP.

The CP3003-SA is available with dual- and quad-core CPU performance scalable from the ULV 1.7 GHz Intel® Core™ i7-3517UE up to the 2.1 GHz i7-3612QE processor, Intel® Celeron® processors will be offered on request. The new Intel® HD4000 graphics with integrated DirectXTM 11, OpenGL 3.1 and OpenCL 1.1 support provides an up to four times better graphics performance compared to previous platform designs. Additionally, now three independent graphics outputs are supported. Memory-demanding applications can make use of up to 16GB 1600MHz DDR3 SDRAM with Error Checking and Correction (ECC). For on-board data storage the CP3003-SA offers up to 32GB on a dedicated SLC SATA Flash module or a HDD/SSD and CFast option on the 8HP extension module.

On the system side, the CP3003-SA supports a PCI 32-bit, 33MHz (66MHz on request) CompactPCI interface enabling the peripheral mode feature. When installed in a system master slot, the CompactPCI interface is enabled, whereas the CompactPCI interface will be isolated when installed in a peripheral slot.

**Variety of Interfaces and Options**

The CP3003-SA comes with a comprehensive I/O feature set supporting known and established interfaces such as VGA, USB2.0, Gigabit Ethernet and serial ports as well as the new high-speed Interfaces USB3.0 and SATA 6Gb/s. By adding one of the three extension modules - XMC Carrier, Legacy I/O or SATA/USB extension – the CP3003-SA’s I/O capabilities will be further extended. Backwards compatibility is also granted - the optional Rear I/O interface is compatible with predecessor CPU boards.

**System Security**

The Trusted Platform Module (TPM) provides hardware-based encryption mechanisms to create, seal or store keys, passwords and or other crucial data.

**Long-Term Availability**

Investing in a new project is always a challenge and risky. Extending the lifetime of an application to the possible maximum is therefore a critical issue to save the development investments. Delivering a stable product based on Intel®’s embedded product line, the CP3003-SA ensures long-term availability. This eliminates the risk of unplanned design changes and unexpected expensive application modification. While minimizing deployment risks by providing a broad range of software support, the CP3003-SA eases the process of product integration and maximizes your competitive advantage to meet your time-to-market window.
### Technical Information

#### Processor
- 3rd Generation Intel® Core™ i7 processor (22nm technology):
  - i7-3612QE: Quad-Core 2.1 GHz, SV, 6MB L3 cache (shared instruction/data cache, shared among all cores)
  - i7-3555LE: Dual-Core 2.5 GHz, LV, 4MB L3 cache (shared instruction/data cache, shared among all cores)
  - i7-3517UE: Dual-Core 1.7 GHz, ULV, 4MB L3 cache (shared instruction/data cache, shared among all cores)
- Celeron® processor is offered on project request

All boards are passive cooled with a heatsink in 4HP height
Forced air cooling at specific flow rate is required depending on the processor version

#### Memory
**System Memory**
Up to 16GB dual channel DDR3 SDRAM running at 1600 MHz, with ECC, via two SODIMM sockets

**Boot Flash (UEFI)**
Two redundant 8 MB SPI boot flashes with fail-over functionality

**EEPROM**
Serial EEPROM (24LC64) 64 Kbit for storing uEFI BIOS settings and serial number

**SATA NAND Flash**
Up to 32GB SLC NAND flash on a dedicated SATA NAND Flash module
The SATA NAND Flash option is only available on a 4HP CP3003-SA

**HDD**
Onboard 2.5” SATA SSD/HDD installation via CP3003-HDD extension, optionally available with two SSD/HDD

**CFast**
Onboard CFast installation via 8HP extension

#### Onboard Controller
**Platform Controller Hub**
- Mobile Intel® QM77 Platform Controller Hub featuring:
  - USB host interface with ten USB2.0 and four USB3.0 ports
  - (only four USB2.0 and two USB3.0 ports are used on the CP3003-SA)
  - SATA host controller with four SATA 3Gb/s and two SATA 6Gb/s ports with RAID 0/1/5/10 support
  - Eight x1 PCI Express 2.0 ports operating at 5.0 GT/s (only four x1 PCI Express ports are used)
  - High-Definition Audio Interface

**Graphics**
High performance 3D graphics controller integrated in the processor:
- Support for up to 3x independent graphics outputs
- Supports analog display resolutions up to 2048 x 1536 pixels @ 75 Hz
- Supports digital display resolutions up to 2560 x 1600 pixels @ 60 Hz
- Dynamic Video Memory Technology (DVMT)

**Gigabit Ethernet**
Up to three 1000BASE-T interfaces, two front/rear switchable with WOL (Wake-on-LAN) support, third available via extension CP3003-HDD, Intel 82574L Ethernet controller

**UART**
XR16L2750IM-F, dual UART, 16C550-compatible

**Watchdog**
FPGA-based, timeout ranging from 125ms to 4096s programmable in 16 steps, IRQ, reset, dual-stage configuration

**RTC**
Integrated in PCH, with 256 Byte CMOS RAM

**Trusted Platform Module (TPM)**
Atmel AT97SC3204 TPM 1.2 controller

#### Front Interfaces 4HP
**VGA**
1x VGA-CRT 15-pin D-Sub connector

**USB**
2x USB 2.0 ports, 4-pin standard USB connectors

**Ethernet**
2x RJ-45 with integrated LEDs (ACT, SPEED)

**LED’s**
6x LEDs: 4x POST Code or General Purpose, WD, TH

#### Onboard Interfaces
**SATA Cable Connector**
1x onboard standard 7-pin SATA connector with locking mechanism, SATA 6Gb/s

**High-Speed Extension Connectors**
2x high-speed connectors holding:
- PCI Express
- One SATA 3Gb/s
- One SATA 6Gb/s
- 2x USB 2.0/3.0
- 2x DisplayPort
- COM1 (TTL)
- HDA
- LPC

**SATA Extension Connector**
1x 18-pin connector holding one SATA port for the SATA NAND Flash module
### Rear I/O via J2
The CP3003-SA supports:
- 2x SATA 3Gb/s ports
- 2x Gigabit Ethernet ports without LED signals
- 2x USB 2.0 ports
- 1x VGA analog port
- 2x COM port RS-232 (LVTTL signal level)
- 5x GPIOs and 3x GPOs (LVTTL signal level)
- Reset and Power Management signals

Option to write protect non-volatile RAMs via a special pin

### CompactPCI Bus Interface
PICMG 2.0 Rev. 3.0 compatible, 32-bit/33MHz (66MHz on request), version with rear I/O via J2
Universal 5V and 3.3V PCI signalling voltage supported, 7 Req/Gnt & clock lines
Operating in system slot as system master and in peripheral slot in PCI passive mode

### Hot Swap
Support for all signals to allow peripheral boards to be hot swapped. The individual clocks for each slot and access the backplane ENUM# signal comply with the PICMG 2.1 Hot Swap Specification

### Supervisory Functions
- Watchdog, software configurable, 125ms to 4096s in 16 steps, generates IRQ or hardware reset or dual-stage configuration

### Software Support
- AMI uEFI, setup console redirection to serial port (VT100 mode) with CMOS setup access, EFI Shell support, board configuration via Shell, diskless, keyboardless, videoless operation
- LAN boot support
- Board identification number accessible via EEPROM

(Other OSs may also be used with the CP3003. Please contact Kontron for further information)

### Compliancy
- CompactPCI Core Specification PICMG 2.0 Rev. 3.0
- CompactPCI Hot Swap Specification PICMG 2.1 Rev. 2.0

Designed to meet or exceed:
- Safety: UL 60950-1, CSA 22.2 No 60950, EN 60950-1, IEC 60950-1
- EMI/EMC: EN 55022 / EN 55024, EN 61000-6-3 / EN 61000-6-2

### General
- **Dimensions**
  3U 4HP/8HP/12HP CompactPCI, 100 x 160 mm
- **Weight**
  CP3003-SA 4HP: 320 g
- **MTBF**
  72,266 h acc. to MIL-HDBK-217 FN2, Ground Benign, controlled at 30°C
- **Power Consumption**
  CP3003-SA with i7-3555LE DC 2.5 GHz typ. 21W
  CP3003-SA with i7-3612QE QC 2.1 GHz typ. 29W

### Environmental
- **Operating Temperature**
  0°C to +60°C, standard
  -40°C to +85°C, extended temp. E2 (with ULV processor)
- **Storage Temperature**
  -40°C to +85°C (without additional components)
- **Climatic Humidity**
  93% RH at 40°C, non-condensing (acc. to IEC 60068-2-78)

### CP3003-SA Expansion Capabilities

The CP3003-SA provides various expansion capabilities via specifically designed modules such as the SATA Flash Module, the Smart Extension Module, the CP3003-HDD module and the CP3003-XMC module. The 4HP CP3003-SA can accommodate two modules, the SATA Flash Module and the Smart Extension module. The SATA Flash Module is available with up to 32 GB SLC NAND flash memory and can be used as storage device for onboard data or operating system data. The SATA Flash Module is specifically designed and optimized for embedded systems providing high performance, reliability and security. The Smart Extension Module expands the onboard I/O capability and provides one additional SATA cable connector plus one USB 2.0 connector thereby facilitating the connection to system-internal USB and SATA devices. Furthermore, two extension modules are available to expand the CP3003-SA to a double-slot 8HP version, the CP3003-HDD module and the CP3003-XMC module.

If more interfaces to the front are needed, the CP3003-HDD is the right choice. This module provides one USB 3.0 port, one Gigabit Ethernet interface, two DisplayPorts, and one COM interface on the front panel. In addition, the CP3003-HDD module provides support for a 2.5" SATA HDD/SSD and a CFast card. As a further extension capability of the CP3003-SA to 12HP, a SATA adapter module is available with the CP3003-HDD to provide an additional SATA connector for 2.5" SATA HDD/SSD devices. The 12 HP CP3003-SA does not provide a CFast socket.

The CP3003-XMC module provides one x8 (or less) PCI Express 2.0-compliant interface with up to 5 GT/s for one XMC module. In addition, the CP3003-XMC module is capable of accommodating a CFast card.
SATA Flash Module

**Technical Information**

<table>
<thead>
<tr>
<th>Memory</th>
<th>Up to 32 GB SLC-based NAND Flash memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAND Flash Memory</td>
<td>32nm Toshiba Single Level Cell Components</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>Up to 60 MB/s read rate</td>
</tr>
<tr>
<td></td>
<td>Up to 55 MB/s write rate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>38 x 27mm</td>
</tr>
<tr>
<td>Weight</td>
<td>Ca. 7 grams</td>
</tr>
<tr>
<td>MTBF</td>
<td>3,848,557 h acc. to MIL-HDBK-217 FN2, Ground Benign, controlled at 30°C</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>Typ. 0.5W, 3.3V supply</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>0°C to +60°C, standard</td>
</tr>
<tr>
<td></td>
<td>-40°C to +85°C, extended temperature</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Climatic Humidity</td>
<td>93% RH at 40°C, non-condensing (acc. to IEC 60068-2-78)</td>
</tr>
</tbody>
</table>

Smart Extension Module

**Technical Information**

<table>
<thead>
<tr>
<th>Onboard Interfaces</th>
<th>One onboard angled standard SATA connector</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One onboard angled standard USB 2.0 connector</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>34 x 49 mm</td>
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<tr>
<td>Weight</td>
<td>Ca. 11 grams</td>
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<tr>
<td>MTBF</td>
<td>6,534,579 h acc. to MIL-HDBK-217 FN2, Ground Benign, controlled at 30°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>0°C to +60°C, standard</td>
</tr>
<tr>
<td></td>
<td>-40°C to +85°C, extended temperature</td>
</tr>
<tr>
<td>Storage Temperature</td>
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</tr>
<tr>
<td>Climatic Humidity</td>
<td>93% RH at 40°C, non-condensing (acc. to IEC 60068-2-78)</td>
</tr>
</tbody>
</table>
Technical Information

Front Interfaces (8HP)
- DisplayPort: 2x 20-pin DisplayPort connectors, DVI/HDMI capable through passive cable adapter
- Ethernet: 1x RJ-45 with integrated LEDs (ACT, SPEED)
- USB: 1x USB 3.0 port, 9-pin type-A connector
- Serial Port: 1x 16C550-compatible serial port, RS232 signalling, RJ-45
- Control: Reset button and HDD activity LED

Onboard Interfaces
- SATA: 1x SATA connector for connecting a SATA 2.5" HDD/SSD (SATA 6Gb/s), Option to add 2nd SATA HDD/SSD (results in 12HP stacking height and CFast socket won’t be available)
- CFast: 1x CFast card socket

General
- Weight: CP3003-SA 8HP: 460 g, CP3003-SA 12HP: 520 g
- MTBF: 1,120,458 h acc. to MIL-HDBK-217 FN2, Ground Benign, controlled at 30°C
- Power Consumption: typ. 0.5W, without peripheral devices connected

Environmental
- Operating Temperature: 0°C to +60°C, standard
- Storage Temperature: -40°C to +85°C, extended temperature
- Operating Temperature: -40°C to +85°C (without additional components)
- Climatic Humidity: 93% RH at 40°C, non-condensing (acc. to IEC 60068-2-78)
### CP3003-XMC

#### Technical Information

<table>
<thead>
<tr>
<th><strong>Front Interfaces (8HP)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>XMC</td>
<td>XMC front panel bezel cutout</td>
</tr>
<tr>
<td>Control</td>
<td>Reset button and CFast activity LED</td>
</tr>
</tbody>
</table>

**Onboard Interfaces**

- **XMC**: 1x onboard XMC connector (P15),
- **CFast**: 1x CFast card socket

**General**

- **Weight**: CP3003-SA 8HP: 430 g
- **MTBF**: 2,017,352 h acc. to MIL-HDBK-217 FN2, Ground Benign, controlled at 30°C
- **Power Consumption**: Depends on XMC module, typ. 0W without XMC

**Environmental**

- **Operating Temperature**: 0°C to +60°C, standard
  - -40°C to +85°C, extended temperature
- **Storage Temperature**: -40°C to +85°C (without additional components)
- **Climatic Humidity**: 93% RH at 40°C, non-condensing (acc. to IEC 60068-2-78)
### Ordering Information

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP3003-SA</td>
<td>Core i7-3612QE, Quad-Core 2.1GHz, 6MB L3, 8GB (2x 4GB) SODIMM DDR3 with ECC, 4HP, Front I/O, with TPM</td>
</tr>
<tr>
<td>CP3003-SA-2.1Q-8-4F-T</td>
<td>Core i7-3612OE, Quad-Core 2.1GHz, 6MB L3, 8GB (2x 4GB) SODIMM DDR3 with ECC, 4HP, Rear I/O, with TPM</td>
</tr>
<tr>
<td>CP3003-SA-2.1Q-8-8R-T</td>
<td>Core i7-3612OE, Quad-Core 2.1GHz, 6MB L3, 8GB (2x 4GB) SODIMM DDR3 with ECC, 8HP with CP3003-HDD, Rear I/O, with TPM</td>
</tr>
<tr>
<td>CP3003-SA-2.1Q-8-8R-T</td>
<td>Core i7-3555LE, Dual-Core 2.5GHz, 4MB L3, 4GB (2x 2GB) SODIMM DDR3 with ECC, 8HP with CP3003-HDD, Front I/O, with TPM</td>
</tr>
<tr>
<td>CP3003-SA-2.1Q-8-4R-T</td>
<td>Core i7-3555LE, Dual-Core 2.5GHz, 4MB L3, 8GB (2x 4GB) SODIMM DDR3 with ECC, 8HP with CP3003-HDD, Rear I/O, with TPM</td>
</tr>
<tr>
<td>CP3003-SA-2.5D-4-8F-T</td>
<td>Core i7-3517UE, Dual-Core 1.7GHz, 4MB L3, 4GB (2x 2GB) SODIMM DDR3 with ECC, 4HP, Front I/O, extended temp. E2, with TPM</td>
</tr>
<tr>
<td>CP3003-SA-2.5D-4-4F-E2-T</td>
<td>Core i7-3517UE, Dual-Core 1.7GHz, 4MB L3, 8GB (2x 4GB) SODIMM DDR3 with ECC, 4HP, Rear I/O, extended temp. E2, with TPM</td>
</tr>
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<td>CP3003-SA-2.5D-8-8R-E2-T</td>
<td>Core i7-3517UE, Dual-Core 1.7GHz, 4MB L3, 8GB (2x 4GB) SODIMM DDR3 with ECC, 8HP with CP3003-HDD, Rear I/O, extended temp. E2, with TPM</td>
</tr>
<tr>
<td>Flash Storage</td>
<td>(as separate items, not mounted on the CPU)</td>
</tr>
<tr>
<td>FLASH-SATA-xGB-CP3002/CP3003</td>
<td>SATA NAND Flash module, various sizes available</td>
</tr>
<tr>
<td>CFASTx</td>
<td>Industrial grade CFast, various sizes available</td>
</tr>
<tr>
<td>Rear Transition Modules</td>
<td>4HP rear I/O module (2x Ethernet, 2x USB, VGA, 2x SATA connectors)</td>
</tr>
<tr>
<td>CP-RIO3-04</td>
<td>8HP rear I/O module (additional to 4HP COM1/2)</td>
</tr>
<tr>
<td>CP-RIO3-04S</td>
<td>4HP rear I/O module (2x Ethernet, COM, VGA, 2x SATA connectors)</td>
</tr>
<tr>
<td>Software</td>
<td>VxWorks 6.9.2 Board Support Package</td>
</tr>
<tr>
<td>VXW-BSP-CP3003-SA-V6.9.2</td>
<td>QNX6.5 Board Support Package</td>
</tr>
<tr>
<td>QNX-BSP-CP3003-SA-V6.5</td>
<td>Notes:</td>
</tr>
<tr>
<td></td>
<td>» Windows and Linux BSPs are only available as download on the web page</td>
</tr>
<tr>
<td></td>
<td>» The SATA NAND Flash module cannot be used in conjunction with the CP3003-HDD/CP3003-XMC module</td>
</tr>
</tbody>
</table>

Please contact your local sales representative for other configuration options.