CP6000

6U Pentium® M
PICMG 2.16 CPU Blade

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User Guide

Apter Power

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1.2 Board Overview

1.2.1 Board Introduction

The CP6000 is a CompactPCI system controller board. It has been designed to support all Intel® Pentium® M and Intel® Celeron® M processors with 400 MHz FSB.

A key performance factor of the Intel® Pentium® M processor 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® Pentium® 4 processor.

The Pentium® M has the advantage of very low power consumption, whilst at the same time providing impressive processor speeds ranging from 1.1 GHz through 1.8 GHz with a Processor Side Bus (PSB) running at 400 MHz. The CP6000 utilizes the Intel® 855GME and 6300ESB I/O Controller Hub chipset.

The board includes two SODIMM sockets to provide up to 2 GB Double Data Rate (DDR) memory with Error Checking and Correcting (ECC) for rugged environments. The CP6000 supports memory speed up to 333 MHz (PC2700).

The CP6000 offers more features and expandability than other CompactPCI boards in its class. The board comes with two onboard Ultra ATA/100 interfaces, two Serial ATA interfaces, four Gigabit Ethernet ports (two Intel® 82546GB controllers), up to four USB 2.0 ports, one PMC interface with 64-bit/66 MHz on the PCI-X bus, rear I/O with several interfaces, one CompactFlash type II socket and a built-in Intel 3D Graphics accelerator with up to 64 MB of shared memory for enhanced graphics performance with a VGA CRT-display interface. Several onboard connectors provide flexible expandability.

The board supports a configurable 32-bit/33 MHz, hot swap CompactPCI interface. In the System Master slot the interface is enabled, and if installed in a peripheral slot, the CP6000 is isolated from the CompactPCI bus.

One of the more important features of the CP6000 is its support of the PICMG CompactPCI Packet Switching Backplane Specification 2.16. When installed in a backplane which supports packet switching, the CP6000 can communicate via two Gigabit Ethernet interfaces with other peripherals.

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.

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

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1.2.2 Board-Specific Information

The CP6000 is a CompactPCI 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 CP6000's outstanding features are:

- Supports all Intel® Pentium® M and Intel® Celeron® M microprocessors with 400 MHz FSB
- 479-pin µFCBGA package
- Up to 2048 kB L2 cache on-die, running at CPU speed
- 400 MHz processor system bus
- 855GME and 6300ESB chipset
- Up to 2 GB DDR SDRAM memory running up to DDR333 (PC2700)
- Integrated 3D high performance VGA controller
- Analog display support up to 2048 x 1536 pixels at 16-bit and 60 Hz
- PMC interface (64-bit/66 MHz PCI-X, 3.3V only) with rear I/O support and bezel cutout on front panel and PCI-X functionality
- Four Gigabit Ethernet interfaces
  - Two Gigabit Ethernet interfaces on the front panel
  - Two Gigabit Ethernet interfaces on rear I/O (PICMG 2.16)
- Two EIDE Ultra ATA/100 interfaces
- Two Serial ATA interfaces on rear I/O, one thereof can be routed to onboard connectors
- Optional socket for 2.5" hard disk (only for standard temperature range)
- Onboard CompactFlash type II socket (True IDE)
- Four USB ports
  - Two USB 2.0 ports on the front panel
  - Two USB 2.0 ports on rear I/O
- 1 MB onboard FWH for BIOS
- Hardware Monitor (LM87)
- Floppy disk interface on rear I/O
- Watchdog timer
- Real-time clock
- Two COM ports on rear I/O (RS-232/RS-422/RS-485)
- I/O extension connector (LPC)
- 4HP, 6U CompactPCI
- Jumperless board configuration
- Extended temperature range: -40°C to + 85°C (optional)
- Passive heat sink solution for external airflow
- AMI BIOS
- PCI-X interface onboard (64-bit/66 MHz)
- Compatible with CompactPCI spec. Rev. 3.0 (32-bit/33 MHz)
- Hot swap capability: as system controller or as peripheral device
- Supports PICMG Packet Switching Backplane Specification 2.16
- Several rear I/O configurations
- Rear I/O on J3 and J5; optionally on J4
- IPMI compliant Baseboard Management controller

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1.3 System Expansion Capabilities

1.3.1 PMC Modules

The CP6000 has one PCI-X, 64-bit/66 MHz, 3.3V, rear I/O capable, PMC mezzanine interface. This interface supports a wide range of available PMC modules with PCI and PCI-X interface including all of Kontron's PMC modules and provides an easy and flexible way to configure the CP6000 for various application requirements.

1.3.2 CTM80-2 Rear I/O Module

The CTM80-2 rear I/O module has been designed for use with the CP6000 6U CompactPCI board from Kontron Modular Computers. This module provides comprehensive rear I/O functionality and may also be configured for use in other applications.

For further information concerning the CTM80-2 module, please refer to Appendix A.

1.3.3 CP6000-EXT-SATA Module

The CP6000-EXT-SATA module (order no. CP6000-MK2.5SATA) has been designed for use with the CP6000 6U CompactPCI board from Kontron Modular Computers and enables the user to connect an onboard 2.5" Serial ATA hard disk to the CP6000.

For further information concerning the CP6000-EXT-SATA module, please refer to Appendix B.

1.4 System Relevant Information

The following system relevant information is general in nature but should still be considered when developing applications using the CP6000.

Table 1-1: System Relevant Information

SUBJECT	INFORMATION
System Slot/System Master Functionality	The CP6000 is designed for use as a System Master board whereby it can support up to 7 peripheral boards with 32-bit/33 MHz. It may, however, be operated in a peripheral slot in which case it does not support the CompactPCI bus interface.
Peripheral Slot Functionality	When installed in a peripheral slot, the CP6000 is electrically 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).
Hot Swap Compatibility	When operated as a System Master, the CP6000 supports individual clocks for each slot and ENUM signal handling is in compliance with the PICMG 2.1 Hot Swap Specification. When operated in a peripheral slot the CP6000 supports basic hot swap.
Operating Systems	The CP6000 can be operated 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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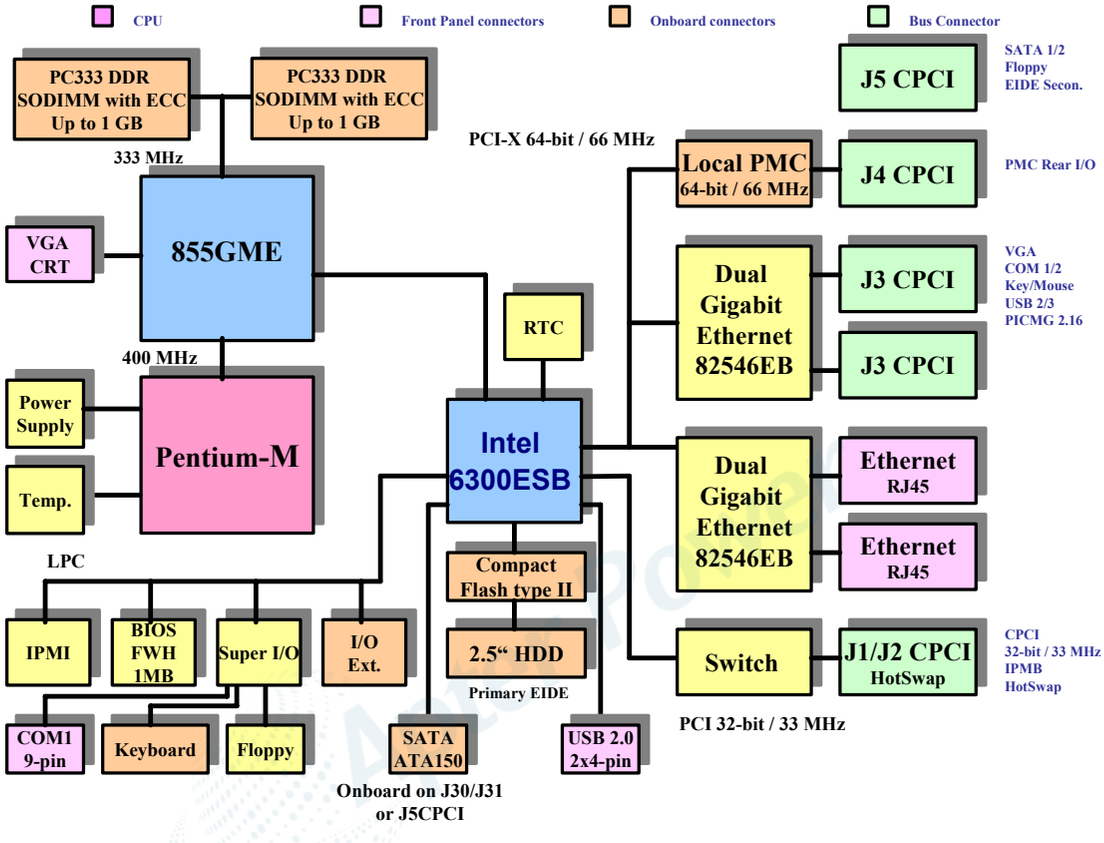
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1.5 Board Diagrams

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

1.5.1 Functional Block Diagram

Figure 1-1: CP6000 Functional Block Diagram



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1.5.2 Front Panels

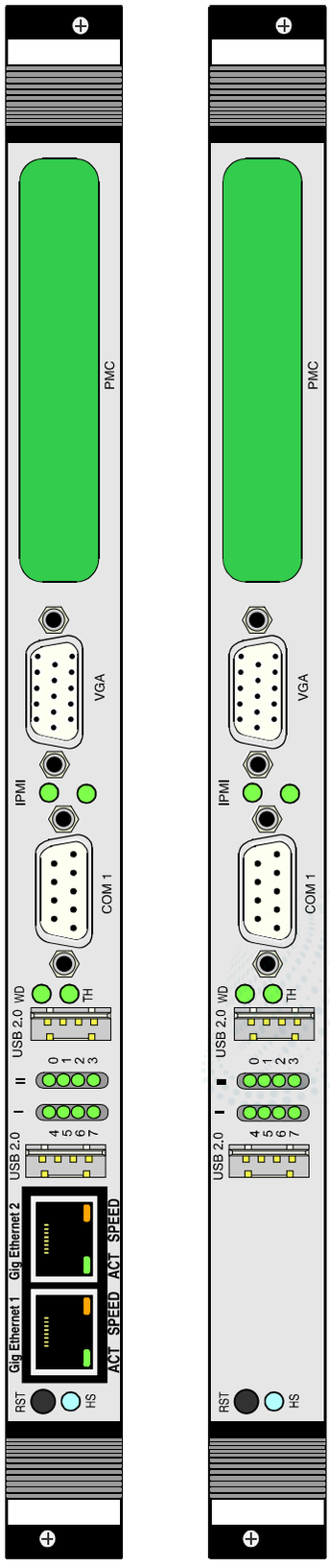


Figure 1-2: CP6000 4 HP Front Panels

Legend:

Left CP6000 with Front Panel Gigabit

Right CP6000 with PICMG 2.16 only

IPMI LEDs

IPMI (green): Indicate the software status of the IPMI controller.

General Purpose LEDs

WD (green): Watchdog, when lit during bootup, it indicates a PCI reset is active.

TH (green): Overtemperature Status, when lit during bootup, it indicates a power failure.

HS (blue): Hot Swap Control

Front-I: General Purpose or POST code

Front-II: General Purpose or POST code

Integral Ethernet LEDs

ACT (green): Ethernet Link/Activity

SPEED (green/orange): Ethernet Speed

SPEED ON (orange): 1000 Mbit

SPEED ON (green): 100 Mbit

SPEED OFF: 10 Mbit

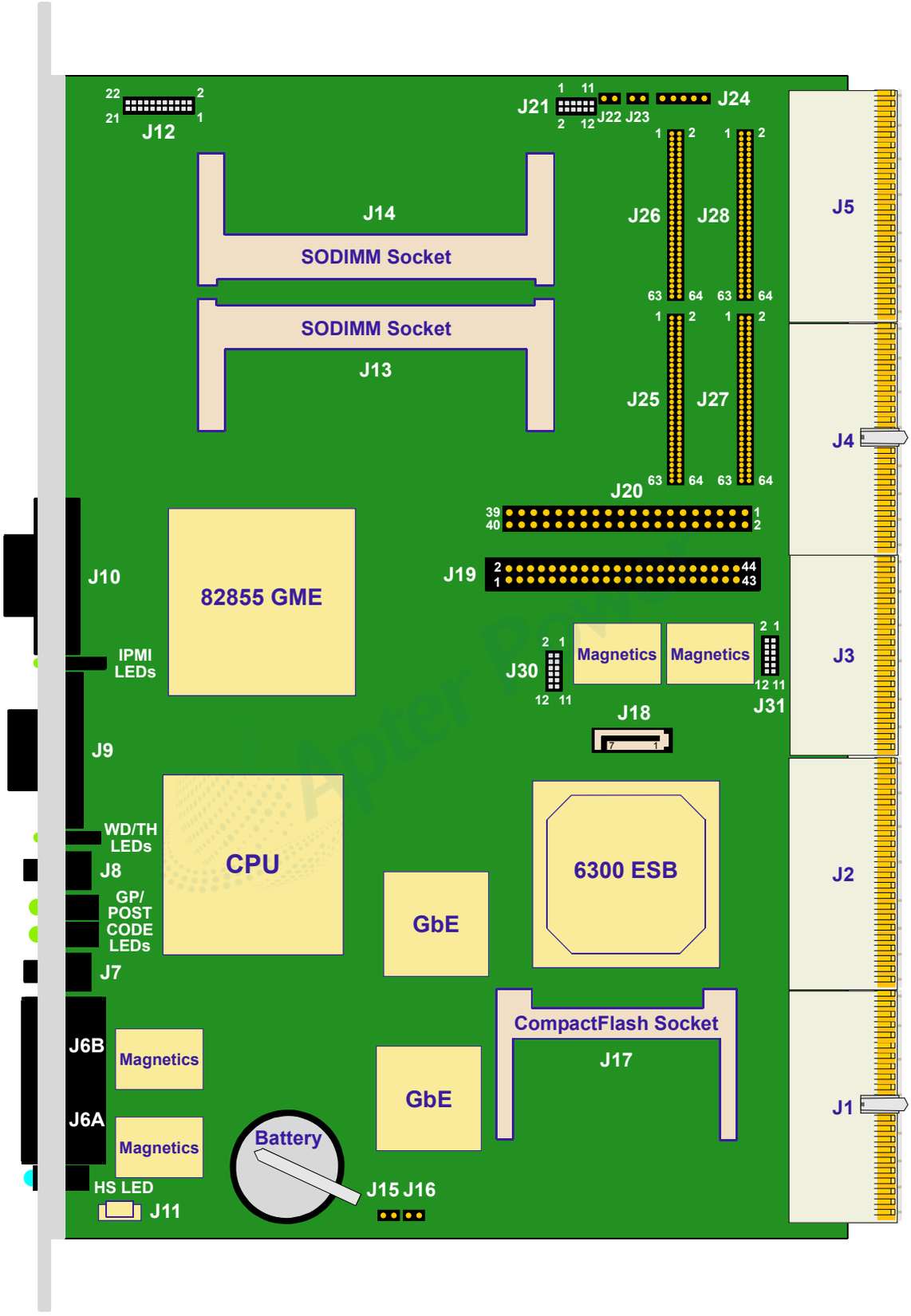
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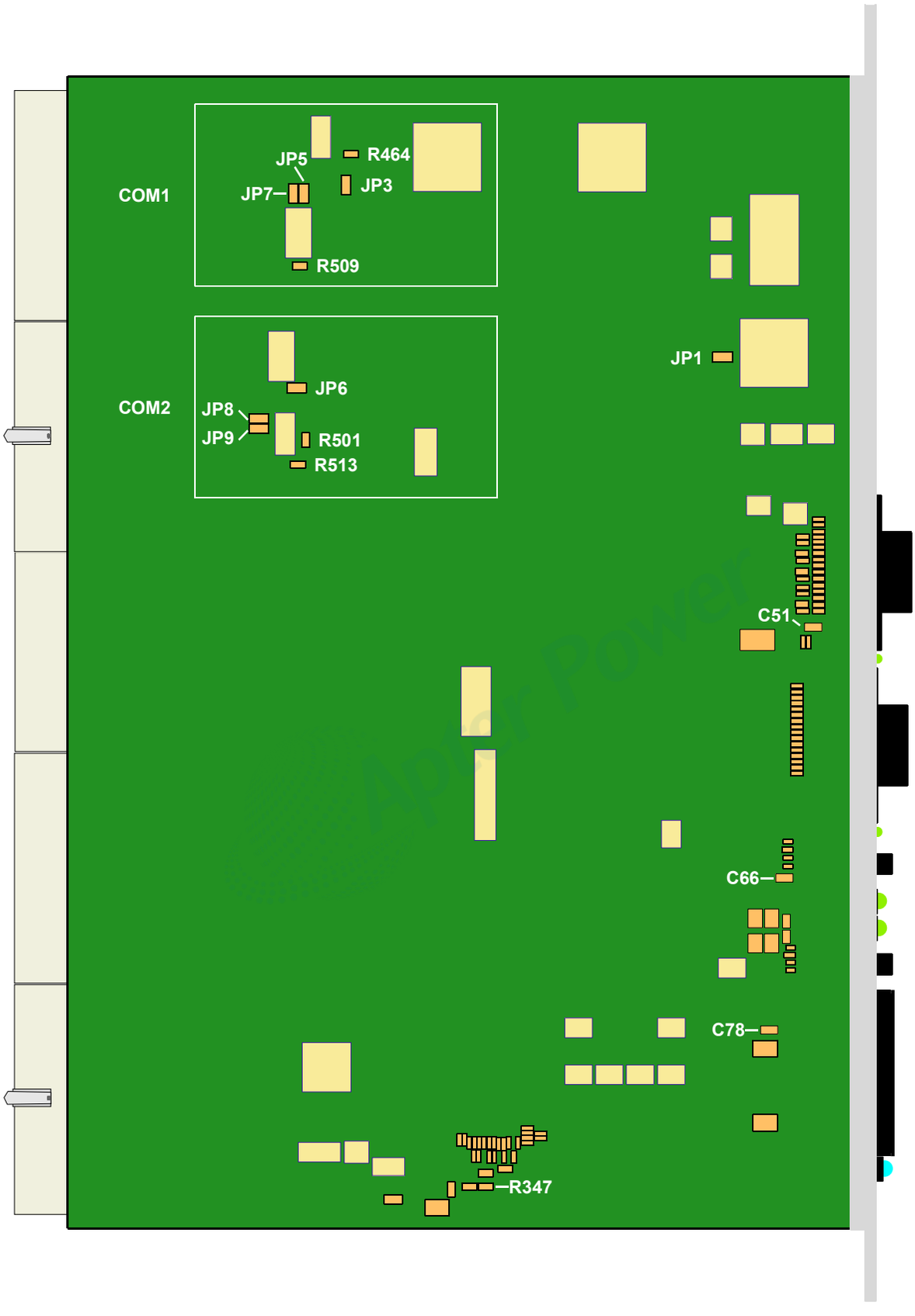
1.5.3 Board Layout

Figure 1-3: CP6000 Board Layout (Front View)



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Figure 1-4: CP6000 Board Layout (Reverse View)



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1.6 Technical Specification

Table 1-2: CP6000 4HP Version Main Specifications

	CP6000	SPECIFICATIONS

Processor and Memory	CPU	The CP6000 supports the following microprocessors:
		• Intel® Pentium® M with 1024 kB L2 cache
		  • 1.1 GHz (LV) version
		  • 1.6 GHz version
		• Intel® Pentium® M with 2048 kB L2 cache
		  • 1.4 GHz (LV) version
		  • 1.8 GHz version
		• Intel® Celeron® M with 512 kB L2 cache
		  • 1.3 GHz version
		All microprocessors are provided with 400 MHz PSB (Processor Side Bus) in 479 µFCBGA packaging.

	Memory	Main Memory:
		• Up to 2 GB DDR333 (PC2700), SODIMM socket for DDR SDRAM memory with ECC
		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
		Memory Extension:
		• CompactFlash socket type II (true IDE mode)
		Serial EEPROM:
		• 24LC64 (64 kbit)

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Table 1-2: CP6000 4HP Version Main Specifications (Continued)

	CP6000	SPECIFICATIONS
Chipsets	Intel® 855GME Chipset	Intel® 855GME Graphics Memory Controller Hub (GMCH) • Support for a single Pentium® M microprocessor • 64-bit AGTL/AGTL+ based System Bus interface at 400 MHz • 64-bit System Memory interface with optimized support for DDR333 (PC2700) SDRAM memory with ECC (additional 8 bits for ECC) • Integrated 2D and 3D Graphics Engines • Integrated H/W Motion Compensation Engine • Integrated 350 MHz DAC
	Intel® 6300ESB Chipset	Intel® 6300ESB I/O Controller Hub • PCI-X Rev. 1.0 with support for 64-bit/66 MHz PCI-X operations • 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 • Dual Channel SATA 150 • USB 2.0 host interface with up to four USB ports available on the CP6000 • System Management Bus (SMBus) compatible with most I²C™ devices • Low Pin Count (LPC) interface • Firmware Hub (FWH) interface support

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Table 1-2: CP6000 4HP Version Main Specifications (Continued)

	CP6000	SPECIFICATIONS
Interfaces	CompactPCI	Compliant with CompactPCI Specification PICMG® 2.0 R 3.0 • System Master operation • 32-bit / 33 MHz master interface • 5V compliant (3.3V compliant version, optional) When the CP6000 is operated in a peripheral slot, the CompactPCI bus is electrically isolated (passive mode).
	Rear I/O	The following interfaces are routed to the rear I/O connector J3, J4 and J5: • COM1 and COM2 (RS-232, RS-422 and RS-485 signaling); no buffer on the rear I/O module is necessary • 2 x USB 2.0 • CRT VGA • PS/2 (Mouse / Keyboard) • 2 x Gigabit Ethernet (compliant with PICMG 2.16, R 1.0) • Secondary EIDE (ATA 100) • 2 x SATA 150 • General purpose signals • PMC rear I/O • Floppy disk interface
	Hot Swap Compatible	The CP6000 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 CP6000 supports individual clocks for each slot and ENUM signal handling is in compliance with the PICMG 2.1 Hot Swap Specification.
	VGA	Built-in Intel 3D Graphics accelerator for enhanced graphics performance. • Supports resolutions of up to 2048 x 1536 by 16-bit color resolution at a 60 Hz refresh rate or up to 1280 x 1024 by 24-bit color resolution at an 85 Hz refresh rate. • Hardware motion compensation for software MPEG2 and MPEG4 decoding • The graphics controller provides flexible allocation of video memory up to 64 MB.
	Gigabit Ethernet	Up to four 10 Base-T/100 Base-TX/1000 Base-T Gigabit Ethernet interfaces based on two Intel® 82546GB Ethernet PCI-X bus controllers. • Two channels on rear I/O • Two RJ45 connectors on the front panel • Automatic mode recognition • Automatic cabling configuration recognition Cabling requirement: Category 5, UTP, four-pair cabling
	USB	Four USB ports supporting UHCI and EHCI: • Two USB 2.0 connectors on the front panel • Two USB 2.0 on the rear I/O interface

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Table 1-2: CP6000 4HP Version Main Specifications (Continued)

	CP6000	SPECIFICATIONS
Interfaces	Serial	Two 16C550-compatible UARTs on the rear I/O interface (RS-232, RS-422 and RS-485 signaling), one thereof can be routed to the front panel
	PMC	CMC / PMC P1386 / Draft 2.4a compliant mezzanine interface • Jn1, Jn2, Jn3 and Jn4 PCI mezzanine connectors for standard PMC modules • 64-bit / 33 MHz PCI interface or 64-bit / 66 MHz PCI-X interface • Only 3.3V compatible • Rear I/O supported through the CompactPCI connector J4
	Keyboard and Mouse	Keyboard and mouse are supported • USB Support on 4HP • PS/2 (keyboard and mouse) with rear I/O module (e.g. CTM80-2) • Separate onboard keyboard connector (5-pin) that requires an adapter in order to be connected to a regular keyboard

	Mass Storage	EIDE Ultra ATA/100/66/33:
		• Two interfaces:
		  • Primary EIDE: one 44-pin, 2.0 mm male pinrow EIDE connector for HDD (with CompactFlash card only up to ATA 33), one 50-pin CompactFlash socket
		  • Secondary EIDE: one 40-pin, 2.54 mm, male pinrow EIDE connector (standard), and rear I/O connector
		• Up to four devices (one CompactFlash and up to three hard disks or CD-ROMs)
		Onboard 2.5" hard disk:
		• Onboard 2.5" hard disk is supported on a 44-pin Parallel ATA interface or a 22-pin Serial ATA interface (only for standard temperature range)
		• For the Serial ATA interface, the CP6000-EXT-SATA module is used
		CompactFlash:
		• CompactFlash type II socket (true IDE mode and DMA support)
		• Supports type I and II CompactFlash cards and IBM Microdrive™
		SATA: Integrated Serial ATA Host Controllers
		• Provides independent DMA operation on 2 ports, one onboard port which can be routed to rear I/O, and one additional port only on rear I/O
		• Data transfer rates up to 150 MB/s
		Floppy Disk (only with rear I/O module):
		• Supports 5.25" or 3.5" floppy drives
		• 1.44 or 2.88 MB, 3.5" floppy disks

	I/O Extension Interface	I/O extension interface: • LPC devices

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Table 1-2: CP6000 4HP Version Main Specifications (Continued)

	CP6000	SPECIFICATIONS
General	Mechanical	6U, 4HP, CompactPCI compliant form factor
	Power Consumption	See Chapter 5 for details
	Temperature Range	Operational: 0°C to +60°C Standard -40°C to +85°C E2 (optional; only with designated CPU types and DDR memory modules) 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	233.35 mm x 160 mm
	Board Weight	477 g (4HP variants with standard 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	• VGA: 15-pin, D-Sub connector • USB: two 4-pin connectors • Ethernet: up to two RJ-45 connectors • COM: 9-pin, D-Sub connector • PMC front panel

	Onboard Connectors	• Two EIDE interfaces supporting Ultra ATA/100/66/33
		  • One 44-pin, 2.0 mm connector
		  • One 40-pin, 2.54 mm connector
		• CompactFlash socket for type I, II and MicroDrive devices (primary EIDE interface)
		• I/O extension connector
		• PMC connector Jn1 - Jn4
		• Optional SATA connectors, either one 7-pin, standard SATA connector, or two 12-pin, SATA extension connectors
		• CompactPCI Connector J1 and J2 (J3 - J5 optional)
		• 5-pin PS/ 2 connector (keyboard)
		• Two 200-pin SODIMM sockets

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Table 1-2: CP6000 4HP Version Main Specifications (Continued)

	CP6000	SPECIFICATIONS
HW Monitoring	LEDs	System status: • TH (green): Overtemperature Status, when remains lit during bootup, it indicates a PCI reset is active. • WD (green): Watchdog, when remains lit during bootup, it indicates a power failure. • IPMI: Control information Gigabit Ethernet status: • ACT (green): network activity • SPEED (green/orange): network speed General Purpose LEDs: • I (green): General Purpose or POST code • II (green): General Purpose or POST code
	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: • Several system power voltages • Two fan speed input
	IPMI	1.5 IMPI compliant Baseboard Management Controller (BMC) that supports keyboard-style and block transfer interfaces. The IPMI has been designed to monitor and control: • All system power voltages • The CPU surrounding board temperature • Up to two fan speed inputs • The hot swap LED • The hot swap controller The IPMI supports two I²C busses via the J1 and J2 connectors.

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