Data Sheet

DCP-1201P

Dual Core™ Intel® CompactPCI Single Board Computer

Features

- Intel® Core™2 Duo
  - 1.5GHz @ 17W (2 cores)
  - 667MHz (5.3GB/s) FSB
  - 64KB L1 cache per core
  - 4MB shared L2 advanced transfer cache
  - 1GB DDR2 SDRAM with ECC
  - 3.2GB/s memory bandwidth
  - Intel MMX, SSE, SSE2, and SSE3 SIMD instruction support
- High-performance Intel 7520 MCH
- 6300 ESB ICH
- 16Mb (2MB) Firmware hub
  - Hardware Flash write protection jumper
- 1GB on-board Flash drive
- Two 10/100/1000 Ethernet interfaces
- 3U CompactPCI 33/66MHz interface
- Two RS-232 Async COM ports
- Four RS-422 Async COM ports
- One PMC site, 64-bit / 66MHz PCIx
- PICMG 2.3 compatible - full 64 I/O pin PMC site
- Optimized for conduction-cooled PMCs
- Capacitor backed real time clock
- Additional I/O Options include:
  - 3x USB ports
  - 4x RS-422 COM ports
  - 1x SATA port
  - 4x GPIO lines
- State-of-the-art EFI BIOS
- Windows®, Linux®, VxWorks® BSPs
- World class Longevity of Supply and Longevity or Repair supplied by the Life Cycle support group
- On-board temperature sensors
- Basecard uses 3.3/5V from backplane 3.3V, 5V, and +/-12V are routed to the PMC site
- Occupies single .8" slot in conduction-cooled and two slots in air-cooled
- Available as 1-slot conduction-cooled and 2-slot air-cooled
- Optimized conduction-cooling with TherMax™ thermal frame and direct processor shunts
- EFI BIOS supports Ethernet and USB storage devices
  - Debug monitor with system exerciser functions in BIOS
  - Power-up BIT (PBIT)
  - 6 embedded non-volatile memory programmer (NVMP) for BIOS updates
- VxWorks/Tornado™ integration:
  - Tornado 2.2.x and Workbench 2.0
  - Full suite of drivers for hardware features
  - Run-time BIT libraries for Initiated and Continuous BIT
- Intel supplied DSP libraries for Windows and Linux

Please note:
All hardware features may not be supported by all operating systems. Contact Curtiss-Wright for details and release schedules.

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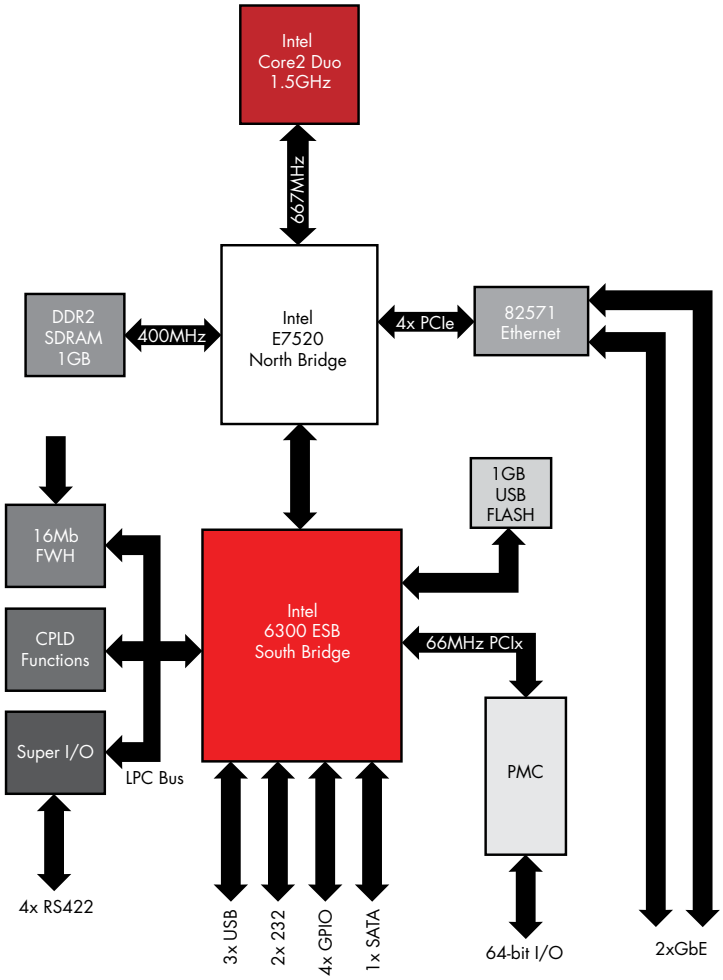
Overview

The DCP-1201P from Curtiss-Wright Controls is a high-performance 3U CompactPCI (cPCI) board built to meet the diverse needs of the evolving embedded community. Designed for space constrained applications, the DCP-1201P represents the latest technology in rugged low-power, highly integrated small form factor Single Board Computers (SBC). Intended to compliment the DCP-1201P, the DCP-1201P is a peripheral only card with a PICMG 2.3 compatible pinout providing full 64-bits of PMC I/O on the P2.

Based on the Intel Core2 Duo with 1GB of ECC DDR2 SDRAM, the DCP-1201P provides high-speed processing while maintaining low power consumption. In addition, the DCP-1201P also offers an unparalleled complement of I/O capability in order to satisfy the most demanding application needs of harsh environments.. For applications requiring ultra low power consumption, the DCP-1201P is available with a BIOS configuration setup capable of turning off one of the processing cores. With this BIOS configuration the DCP-1201P is driven by a single processor core running at 1.5GHz with decreased power consumption.

The challenge of high density computing is to pack the greatest functionality into the smallest standard form factor, while retaining as much flexibility as possible. In conjunction with its processing power, the DCP-1201P meets this challenge by offering a PMC site that allows developers to integrate PMCs directly onto the DCP-1201P. A rich complement of I/O is available on the DCP-1201P including 2GbE ports, one SATA port, two RS-232 ports, four RS-422 ports, four GPIO lines, and three Universal Serial Bus 2.0 (USB) ports.

Figure 1: DCP-1201P Flow-through Architecture



Powerful Intel Server Architecture

The DCP-1201P was designed around Intel's state-of-the-art Core2 Duo processors and the high performance 7520 Northbridge Memory Controller (MCH) and the Intel 6300ESB Southbridge (ICH). These components were specifically designed for server class applications and provide the ultimate in performance. The 7520 Northbridge supports the following features:

- 667MHz Front Side Bus (FSB) which provides 5.3GB/s of data transfer performance between the memory controller and CPUs
- Single 400MHz DDR2 memory bus provides 3.2GB/s of memory bandwidth
- Two PCI Express® (PCIe) links provide high full-duplex I/O bandwidth (up to 1GB/s in each direction)

Careful attention was paid to the flow-through I/O design in the 1201P architecture. Data can be input from the PMC, written to memory, processed by the Dual Core CPU and output to other boards in the chassis, maximizing the I/O and memory bandwidth of all components involved.

Hardware enforced cache coherency, read prefetching, write posting and many other features built into the Intel 7520 MCH provide world class throughput for I/O and processor intensive applications. Applications requiring maximum sustained throughput are ideally suited to this SBC.

The DCP-1201P has a rich set of I/O capabilities as well. An Intel 6300ESB Southbridge combined with a dual channel GbE controller, and a super I/O chip are all present in the design. Various I/O modes provide access to the following capabilities:

- 1x Serial ATA port (1.0)
- 2x GbE ports
- 3x USB ports
- 2x RS-232 Async Ports
- 4x RS-422 Async ports
- 4x GPIO
- 1x PMC Site
- 1x On-board USB Flash

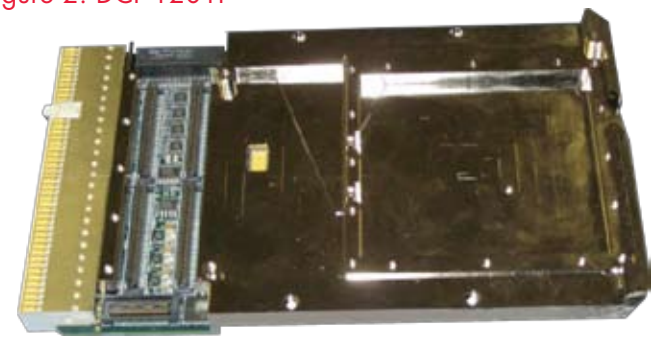
High-performance PMC support

One PMC site complements the flow-through architecture of the DCP-1201P. The PMC site shown in the 1201P block diagram (Figure 1) supports PCIx @ 64-bits / 66MHz with 3.3V signaling only.

Designed for Harsh Environments

The DCP-1201P is designed to withstand the harsh environments of military, industrial and aerospace applications. The 1201P is available in conduction-cooled level 200 (see Curtiss-Wright's Ruggedization Guidelines fact sheet for more information). Consult factory for air-cooled availability.

Figure 2: DCP-1201P



Enhanced Thermal Management for Conduction-Cooled Applications

The 1201 uses a combination of thermal management layers within the Printed Wiring Board (PWB) and an aluminum thermal frame that provides a cooling path for the PMC site and for high-power components such as the processors, caches, and bridge devices. The 1201P thermal frame employs a number of innovative design techniques to keep the temperature rise of the electronic components to a minimum, thus increasing the long-term reliability of the product:

- Direct processor thermal shunts
- Provision of both primary and secondary thermal interfaces on PMC sites
- Mid-plane thermal shunts for PMC site
- TherMax design approach
- Full-width thermal interface to back-side slot wall

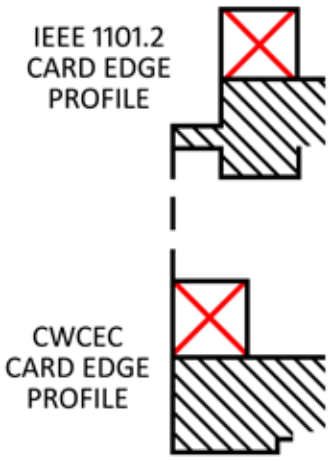
Mid-plane thermal shunts for PMCs

To optimize the conduction-cooling of high performance, high power PMC modules such as graphics or networking PMCs, the 1201P thermal frame incorporates mid-plane thermal shunts for the PMC site. High power PMCs can include a mating cooling surface on the PMC module to contact the mid-plane thermal shunt. By taking advantage of the thermal shunt, suitably designed PMC modules can significantly lower the heat rise from the 1201P card edge to the PMC components. The mid-plane thermal shunt does not impinge on the VITA 20 allowed component height.

TherMax-style Thermal Frame

A TherMax thermal frame provides an unbroken metallic path from the PMC sites and shunted components to the back-side cooling surface of the card therefore minimizing the temperature rise to these devices. In comparison, a typical thermal frame simply sits on top of the PWB and forces heat to flow through the PWB which has a high thermal resistance compared to aluminum.

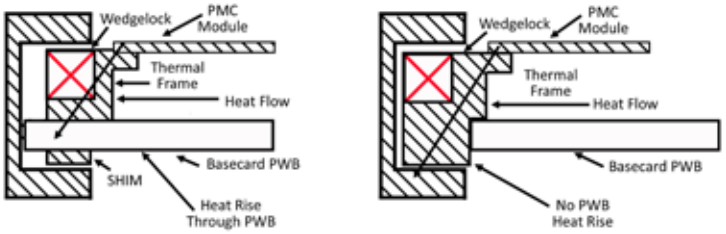
Figure 3: Deviation from 1101.2 Standard



Full-width thermal interface to back-side slot wall

To minimize the temperature rise from the mating slot wall of conduction-cooled enclosures to the back-side thermal interface region of the 1201P, the 1201P thermal frame maximizes the thermal interface area by extending the frame to the full width of the card, as illustrated in Figure 6. This deviation from the IEEE 1101.2 standard, which calls for the thermal frame to be notched for compatibility with card guides in standard air-cooled chassis, has the benefit of lower card operating temperatures and increased long-term reliability. During test and integration activities where it may be desirable to install a conduction-cooled 1201P into an air-cooled card-cage, this can normally be accomplished simply by removing the card guides.

Figure 4: TherMax Style Thermal Frame



Built-in-Self Test (BIT)

Curtiss-Wright's COTS Continuum Initiative defines common software and user interfaces for all Curtiss-Wright products. The DCP-1201P is designed with a rich set of Built-In-Test (BIT) functions both at the BIOS and operating system levels.

Low Power BIOS Variant

For applications requiring ultra low power consumption, the DCP-1201P is available with a BIOS variant capable of turning off one of the processing cores and provide the ability to adjust the processor core speed. Using this new BIOS variant, testing was accomplished on the S/DCP-1201 driving a single processor core running at 1.66GHz (Core Duo) or 1.5GHz (Core2 Duo) with noted decreased power consumption.

Power Draw at Different Processor Speeds

Power testing has also been performed on the air-cooled SCP-1201 at different Core2 Duo processor speeds. The testing was performed at ambient temp (24° C) with the processor running in both dual core and single core modes at different speeds. As expected, the power draw of the SCP-1201 decreased as the processor speed was clocked back.

Single Core operation of the DCP-1201P running Windows XP embedded has nominal power consumption between 24.6 and 27.5 W depending on the processor speed.

Dual Core operation of the DCP-1201P running Windows XP embedded has nominal power consumption between 27.5 and 33.6W depending on the processor speed.



Table 1: Power requirements of each processor mode (dual core vs. single core) at different CPU core speeds

SCP-1201 Single Slot Air Cooled 1.5GHz Core2Duo Ambient 24C (Hotbox unavailable for air-cooled) BIOS 1.1 RC3 S/N: 3158920 (+/-12V rails - no power draw)	5V Rail Current (A)	3.3V Rail Current (A)	Power (W)
Measured backplane voltage (V)	5.1	3.38	-
Dual Core / 1.5GHz / Idle	3.80	0.6	21.44
Dual Core / 1.5GHz/ TDP, 2xGbE 500MB/s xfer	6.20	0.6	33.65
Dual Core / 1.33GHz / Idle	3.80	0.6	21.41
Dual Core / 1.33GHz/ TDP, 2xGbE 500MB/s xfer	5.74	0.6	31.30
Dual Core / 1.0GHz / Idle	3.80	0.6	21.41
Dual Core / 1.0GHz/ TDP, 2xGbE 500MB/s xfer	5.00	0.6	27.53
Single Core / 1.5GHz / Idle	3.80	0.6	21.41
Single Core / 1.5GHz/ TDP, 2xGbE 500MB/s xfer	5.00	0.6	27.53
Single Core / 1.33GHz / Idle	3.80	0.6	21.41
Single Core / 1.33GHz/ TDP, 2xGbE 500MB/s xfer	4.80	0.6	26.51
Single Core / 1.0GHz / Idle	3.80	0.6	21.41
Single Core / 1.0GHz/ TDP, 2xGbE 500MB/s xfer	4.44	0.6	24.67

Notes:
1. TAT does not always pick up frequency. Sometimes it picks up as 0.0GHz, even though it is running properly. RMClock shows current number.
2. Under "My Computer" properties, 1.5GHz is always listed, no matter Fast/Medium/Slow selection. This must be something read from the device ID, and not a measured value.
3. GbE traffic tested with pcattcp utility.
4. Thermal monitoring/throttling disabled on CPU.
5. TDP is Thermal Design Power. Intel sets at 85%.
6. Backplane and RTM measured for power without Eos. 0 power measured.
7. 200 LFM airflow.

Ordering Information

The DCP-1201P is available in a conduction-cooled level 200 configuration. More information on the Curtiss-Wright conduction-cooled ruggedization level 200 is shown below:

Table 2: Ruggedization Table

	Air-cooled	Conduction-cooled
	Level 0	Level 200
Operating Temperature	0°C - 50°C (Note 4)	-40°C - 85°C (Note 6)
Non-Operating Temperature (Storage)	-40°C - 85°C	-55°C - 125°C
Operating Humidity (Non-condensing)	0 - 95%	0 - 100%
Non-Operating Humidity (Storage, condensing)	0 - 95%	0 - 100%
Vibration Sine (Note 1)	2g peak 15-2k Hz	10g peak 15-2k Hz
Vibration Random (Note 2)	$0.01g^2$/Hz 15-2k Hz	$0.1g^2$/Hz 15-2k Hz
Shock (Note 3)	20g peak	40g peak
Conformal Coat (Note 5)	No	Yes
2 Level Maintenance Ready	-	No

Notes:
1. Sine vibration based on a sine sweep duration of 10 minutes per axis in each of three mutually perpendicular axes.
2. May be displacement limited from 15 to 44Hz, depending on specific test equipment.
3. Random vibration 60 minutes per axis, in each of three mutually perpendicular axes.
4. Three hits in each axis, both directions, 1/2 sine and saw tooth. Total 36 hits.
5. Standard air-flow is 8 cfm at sea level. Some higher-powered products may require additional airflow. Consult the factory for details.
6. Conformal coating type is manufacturing site-specific. Please consult the factory for details.

Table 3: Specification Table

Power	<34 Watts maximum, 10 Watts standby, 5V and 3.3V Power required
PMC	3.3V I/O
Weight	340 grams (est.)



Warranty

This product has a one year warranty.

Contact Information

To find your appropriate sales representative, please visit:

Website: www.cwcembedded.com/sales

Email: sales@cwcembedded.com

For technical support, please visit:

Website: www.cwcembedded.com/support1

Email: support1@cwcembedded.com

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