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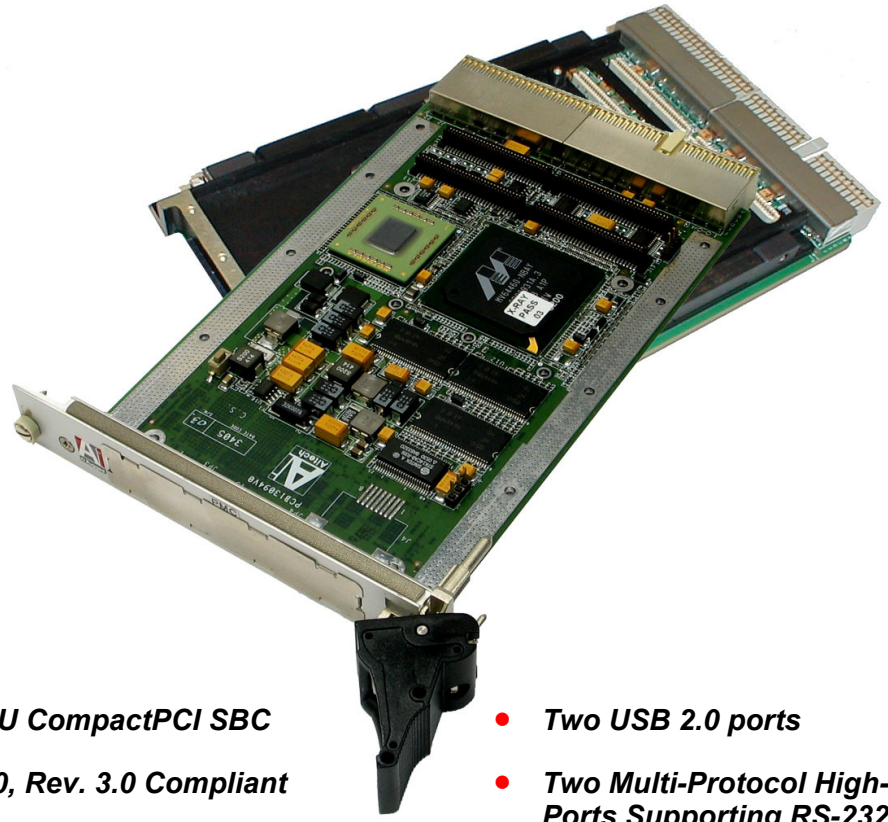
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C900

PowerPC® G4+ Rugged 3U CompactPCI® SBC



- *Rugged 3U CompactPCI SBC*
- *PICMG 2.0, Rev. 3.0 Compliant*
- *G4+ PowerPC® 7447A/7448 Processor @ 1.1 Ghz with AltiVec™ Technology*
- *Marvell MV64460 Discovery™ III System Controller*
- *System Controller or Peripheral Board Operation*
- *Up to 1 GB of DDR SDRAM (@ 133 MHz) with ECC Protection*
- *32 MB Boot Flash Memory*
- *64 MB User Flash Memory*
- *128 kB Autostore NVSRAM*
- *1 GB Flash File (NAND Flash)*
- *Two 10/100/1000 Mb/s Ethernet Ports*
- *Two USB 2.0 ports*
- *Two Multi-Protocol High-Speed Serial Ports Supporting RS-232/422/485*
- *Eight Single Ended TTL or 4 RS-422 Differential Discrete I/O Lines*
- *One Standard PMC Slot*
- *Four High Performance DMA Engines*
- *Four 32-bit Timers*
- *Watchdog Timer*
- *Real Time Clock*
- *On-board Temperature Sensors*
- *Real Time Operating System Support*
- *Conduction and Air Cooled Versions*
- *Vibration and Shock Resistant*

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A member of the Ai-Rugged Group
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C900 Powerful Processing in Compact Form Factor

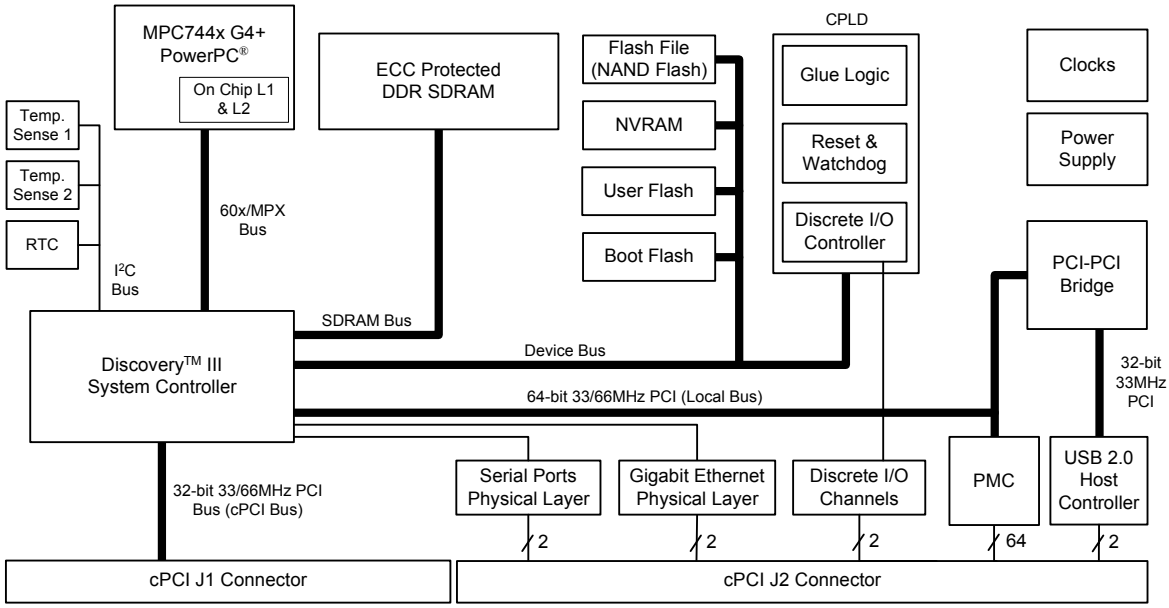
Aitech's C900 is one of the first 3U CompactPCI SBC to provide a powerful processing engine encapsulated in a small form factor designed for harsh environment applications. Powered by Freescale's advanced G4+ MPC7447A/7448 PowerPC® microprocessor with its large integrated on-chip L1 and L2 cache, the C900 provides extremely high computing power. To reduce power consumption, The C900 uses the low power version PowerPC series processor. To ensure high reliability under extreme operating conditions the C900 is capable of accurate temperature self-monitoring and power dissipation control through on-board temperature sensors.

The C900 implements large on-board memory arrays to support the processor and user application needs. Memory resources include up to 1 GB fast DDR (Double Data Rate) SDRAM with ECC protection, 64 MB User Flash, 32 MB Boot Flash, 1 GB Flash File (NAND Flash) and 128 kB NVRAM for user/application specific parameter storage.

In addition to its high performance processor architecture, the C900 provides a variety of I/O capabilities integrated on board. I/O interfaces include two Gigabit Ethernet ports, two high-speed serial communications ports, two USB 2.0 ports, and up to eight general-purpose discrete I/O channels (8 single-ended or 4 RS-422 differential channels). To further expand its capabilities, the C900 is equipped with a PMC slot allowing for installation of additional modules and functionality.

The C900 architecture is designed around Marvell's advanced MV64460 Discovery™ III system controller. The system controller integrates both a memory controller and dual PCI/PCI-X Bridge operating at up to 133 MHz. One of the PCI/PCI-X buses is used internally on the C900 for interconnection with the PMC slot and USB host controller, while the other provides the CompactPCI backplane interconnection. The C900 may perform as either the CompactPCI system controller or as a peripheral board. When configured as system controller, the C900 is capable of supporting up to six additional cards on the CompactPCI backplane, providing clock, arbitration and interrupt capabilities.

The highly integrated design of the C900 guarantees unmatched performance and versatility for a rugged conduction or air-cooled PowerPC 3U CompactPCI SBC.



C900 Block Diagram

Functional Description

Processor and Bus Architecture

The C900 is a powerful processing platform achieved by combining a high performance PowerPC processor and extensive supporting memory arrays. In addition the board's architecture was designed to utilize all bus interfaces to the maximum.

Processor

The C900 features the high performance MPC7447A/ 7448 G4+ PowerPC® 32-bit processor. Integrating both L1 (32 kB instruction/data) and L2 (256 kB) caches on chip supports its powerful processing core.

The processor operating at 1.1 GHz (with higher frequency processors available in the future) provides AltiVec support allowing the user to take advantage of the processor's real-time vector processing capabilities.

Bus Architecture

Supporting the processing unit's high performance and to provide a fast highway for high throughput data transfers, the C900 implements the advanced, highly integrated Discovery III system controller. The Discovery III performs as both the memory controller for the processor and as its bridge to the two PCI bus ports. Configured to support the high speed MPX bus protocols at 133 MHz, the Discovery III provides two separate and totally independent PCI-X bus interfaces. Both PCI buses support 64-bit operation at up to 133 MHz and fully comply with PCI Rev. 2.2 and PCI-X Rev. 1.0 specifications. The C900 utilizes standard PCI bus operation over these two PCI interfaces.

PCI bus 0 is 32 bit 33/66 MHz (per the CompactPCI specification) utilizing the CompactPCI interconnection over the backplane. PCI bus 1 is a 64-bit at 33/66 MHz bus used for on board interconnection to the PMC expansion slot and USB host controller.

To maintain support for 66 MHz operation over the local PCI bus (PCI bus 0) for high-speed PMC modules, the slower PCI USB controller (33 MHz) is attached to the PCI hierarchy through a PCI-PCI bridge. The primary PCI bus of this bridge operates at 66 MHz while its secondary bus - connecting to the USB controller - operates at 33 MHz.

Memory

The C900 is equipped with large memory arrays providing the user with extensive volatile and non-volatile memory resources, all of which are controlled through the Discovery III system controller. These arrays include up to 1 GB fast DDR (Double Data Rate) SDRAM operating at 133 MHz, 32 MB Boot Flash, 64 MB User Flash, 128 kB NVRAM, and up to 1GB Flash File (NAND Flash) for mass storage oriented applications. All memory resources reside on the SDRAM and device bus ports.

The DDR SDRAM bank is ECC protected providing high data integrity.

The 128 kB NVRAM (Non-Volatile RAM) is a fast Flash Shadow RAM with a hardware autostore capability that stores all NVRAM contents to its shadow Flash at the detection of a power failure, without the need for an external power supply.

A 1 GB Flash File, utilizing NAND Flash technology, is also provided on the C900. This block-oriented array provides a mass storage solution to applications requiring high data capacity devices for data storage/ retrieval.

The Boot Flash array is dedicated to firmware storage, freeing all the other arrays for user applications only.

CompactPCI

The C900 utilizes one of the Discovery III PCI bus ports for the CompactPCI backplane interconnection, implementing a standard 64-bit/66 MHz PCI interface, in accordance with the PCI specification. To maximize the I/O pin availability, the C900 utilizes a 32-bit bus over the CompactPCI backplane interface allowing I/O signals to be routed to its J2 connector.

In a CompactPCI subsystem, the C900 is capable of performing either as a system controller, or as a peripheral card. As system controller, the C900 supports up to six additional cards on the PCI backplane providing them with clock signals and arbitration support.

The universal PCI interface supports both 3.3 V and 5 V PCI signaling levels. The C900 drives 3.3 V signals and is 5 V tolerant.

I/O Interfaces

In addition to its superior processing power, the C900 provides many I/O capabilities (relative to its small form factor).

Ethernet

Two 10BaseT, 100BaseTX and 1000BaseT interfaces are provided on the C900.

The Gigabit Ethernet controllers (MAC) are integrated in the Discovery III system controller with internal FIFOs and DMA engines, allowing high bandwidth for data transfer through these interfaces. High performance physical layer devices complete this fast interface.

Serial I/O

The C900 provides two serial ports supporting RS-232/422/485 physical interfaces.

These ports are high-speed, multi-protocol synchronous/asynchronous ports supporting all common serial communications protocols (UART, USART, SDLC, HDLC, Transparent, etc.)

USB 2.0 Ports

The C900 includes a USB Rev. 2.0 host controller (backward compliant with Rev. 1.0 and Rev. 1.1) providing two EHCI/OHCI ports. The controller integrates the USB transceivers supporting high-speed, full-speed, and low-speed signaling. The C900 is capable of providing power to downstream devices. The controller is a PCI device capable of high data transfer rates useing its internal FIFOs and DMA engine.

Discrete I/O

Up to eight single-ended or four differential general-purpose discrete I/O channels are provided on the C900. Each channel may be independently configured as input or output. Configured as input each of these channels may be programmed to generate an interrupt on any level shift event.

The eight discrete I/O signals are divided into two groups, each controlling four signals. Each group may be configured as four single-ended TTL channels or two differential RS-422 channels.

PMC Expansion

The C900 provides one IEEE 1386-2001 or ANSI/VITA 20-2001 compliant PMC expansion slot for extended flexibility and integration of additional I/O to the board.

The PMC slot resides on the fast 64-bit PCI bus port provided by the Discovery III system controller, and is capable of up to 66 MHz bus operation.

The universal PCI interface supports both 3.3 V and 5 V PCI signaling levels. The Discovery III drives 3.3 V signals and is 5 V tolerant.

I/O Routing

All I/O interface signals are available at the C900 J2 CompactPCI rear panel connectors. PMC I/O may also be routed to the J2 connector at the expense of on-board I/O connectivity.

The C900 is available in three basic I/O variants providing several combinations of on-board and PMC I/O at the J2 connector. Refer to the C900 ordering information for additional detail.

Timers

The C900 is equipped with four 32-bit timers/counters providing high-resolution timing functionality as well as chaining for long interval counting applications.

A Real-Time Clock (RTC) provides time and date keeping. The RTC is backed up by a large “super-capacitor” for long-term parameter storage.

A watchdog timer is also available on board the C900. This highly specialized timer may be programmed for the required timeout interval after which it will reset the board.

Software

Test and Diagnostic Features

The C900 is supplied with an extensive firmware package, including startup firmware (boot software), AIMon monitor/debugger tool, AIDiag diagnostic tool, and BIT. BIT may be executed during power-up or at any time after the board has been booted.

A JTAG/COP interface to the processor is provided for debugging and development purposes.

Operating Systems

The C900 is supplied with a complete Board Support Package (BSP) for WindRiver VxWorks.

Other Real-Time operating systems (RTOS) support may be available upon request.

The BSP includes drivers for all on-board resources, allowing the user to take full advantage of the C900’s powerful features.

Mechanical Features

The C900 is available in two mechanical formats:

- Air-cooled: per IEEE 1101.1
- Conduction cooled: per IEEE 1101.2

Both mechanical formats are single slot 3U modules with dimensions in accordance with the referenced specifications.

A custom metal frame provides excellent rigidity and shock resistance. The frame also provides an array of stiffeners to support rugged PMC boards.

Thermal Management

Careful mechanical design, including custom heatsink modules combined with a metal frame, allow for optimal heat dissipation and relief of the board. The C900 is also equipped with two temperature sensors, located at temperature-critical locations, to monitor board temperature and provide temperature data to user application software.

Power Requirements

The C900 receive power from the CompactPCI backplane and generates its specific power supplies on-board.

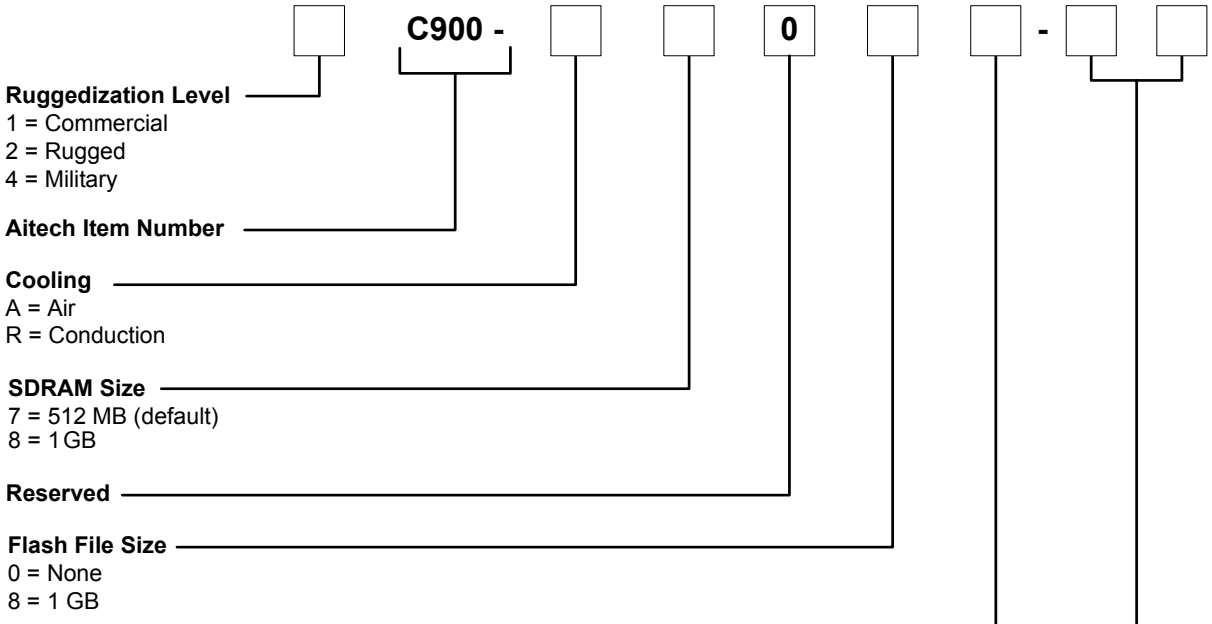
Fully featured and configured, C900 power consumption is as follows:

+3.3V	(± 5%)	2 A
+5.0V	(± 5%)	4 A
+12V	(± 10%)	0 A
–12V	(± 10%)	0 A

Environmental Features

Please Refer to the Aitech Ruggedization Datasheet.

Ordering Information for the C900



Variant	1	2	3	4	5	6
System/Peripheral						
CompactPCI System Slot	x	x	x	-	-	-
CompactPCI Peripheral Slot	-	-	-	x	x	x
I/O Routed to J2						
GB Ethernet	2	1	0	2	1	0
Fast Ethernet	0	0	2	0	0	2
USB	2	2	2	2	2	2
High Speed Serial Ports	2	1	0	2	1	0
Standard UARTs	0	0	2	0	0	2
Discrete I/O Channels	8	8	8	8	8	8
PMC Pins	29	49	49	44	64	64

Configuration No.
To be assigned by Aitech

Example: 2C900-R7084-00

For more information about the C900 or any Aitech product, please contact Aitech Defense Systems sales department at (888) Aitech-8 (248-3248).

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