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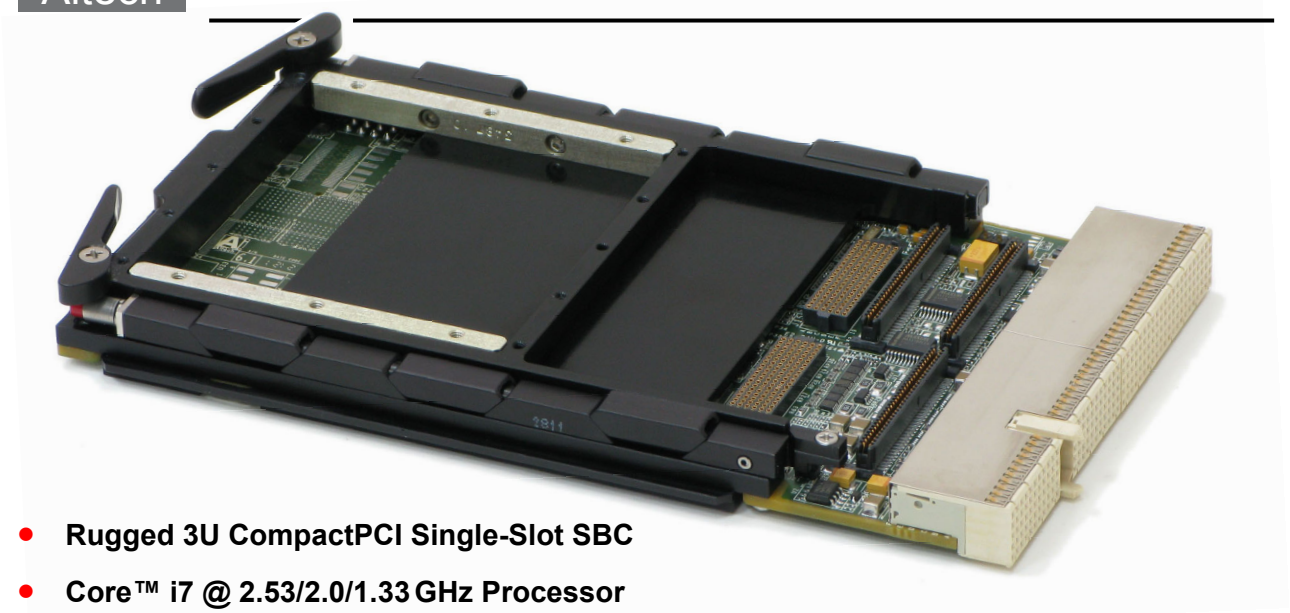
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Find the *Aitech Defense Systems C802* at our website: ***Click HERE***

C802
Core™ i7 3U CompactPCI SBC



- Rugged 3U CompactPCI Single-Slot SBC
- Core™ i7 @ 2.53/2.0/1.33 GHz Processor
  - Two Cores/Four Threads (Intel Hyper-Threading® Technology)
  - Intel Virtualization Technology for Directed I/O (Intel VT-d)
  - Streaming SIMD Extensions 4.2 (Intel SSE4.2) SSE 4.2
  - On-chip 32 kB Data/32 kB Instruction L1 Cache per core
  - 256 k L2 Cache per core
  - 4 MB L3 Cache shared between cores
  - High Performance Graphics Controller
- Memory Resources
  - Up to 4 GB DDR3 SDRAM @ 1066 MHz with ECC
  - Up to 64 GB SATA Flash Disk
  - Dual Redundant BIOS Flash
- I/O Interfaces
  - Two Gigabit Ethernet Ports
  - Two USB 2.0 Ports
  - One SATA II Port
  - Two RS-232/422/485 Serial Ports
  - Eight Discrete I/O Lines
  - RGBHV and HDMI/DVI Display Outputs
  - High Definition Audio (In or Out)
- PMC/XMC Site Supporting 32-bit PCI bus @ 33 MHz and PCIe x8 Gen 2.0
- System Resources
  - Two Temperature Sensors
  - Real Time Clock
  - Avionics Windowed Watchdog Timer
  - Elapsed Time Recorder (ETR)
- Pin Compatible with the C800
- OS Support
  - Windows™
  - Linux®
  - VxWorks®
- PICMG 2.0, Rev. 3.0 Compliant
- Auto System/Peripheral Detection
- Conduction and Air-Cooled Versions
- Vibration and Shock Resistant

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C802 – Core™ i7 3U Compact PCI SBC

Aitech's C802 is a high-performance 3U CompactPCI SBC (Single Board Computer) for embedded and harsh environment applications. The C802 is based on Intel's Calpella (Arrandale + ECC) platform comprising an i7 dual-core/four thread (Intel Hyper-Threading® Technology) processor with large integrated on-chip L1, L2, and shared L3 caches with a companion QM57 PCH I/O controller hub.

The processor's integrated 2D/3D graphics controller supports graphics and video processing and provides RGBHV and DVI output channels.

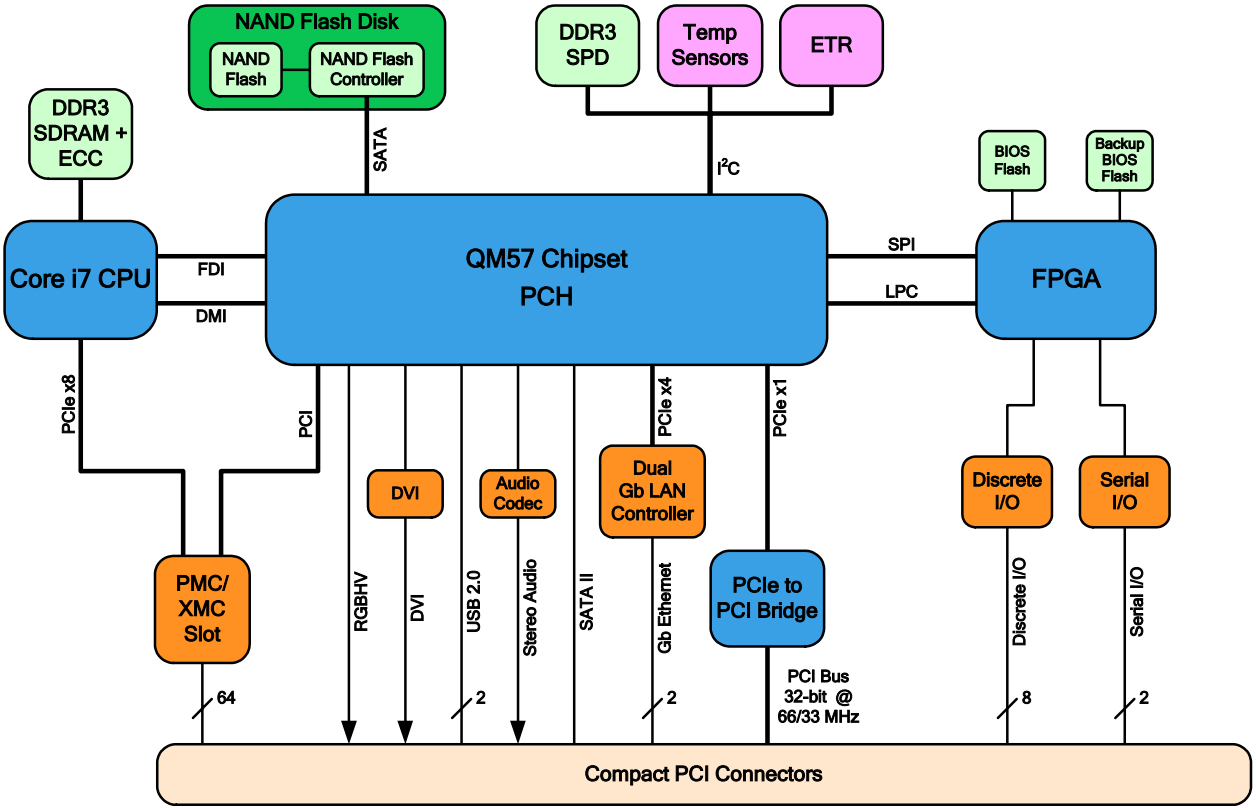
The C802 integrates large on-board memory arrays to support processor and user application needs. Memory resources include up to 4 GB of fast DDR3 SDRAM with ECC protection and up to 64 GB of SATA SSD (based on NAND Flash media) for user/application-specific parameter storage.

In addition to its high-performance processor architecture, the C802 provides a wide variety of I/O, including two Gigabit Ethernet, two USB 2.0 ports, one SATA II port, two UART ports, up to eight general-purpose discrete I/O channels, and high-definition stereo audio I/O. To further expand its capabilities, the C802 is equipped with an industry-standard PMC/XMC slot.

The C802 is available with complete Board Support Packages (BSP) for a variety of operating systems.

The highly integrated design of the C802 guarantees unmatched performance and versatility for a rugged conduction or air-cooled 3U CompactPCI SBC. To ensure high reliability under extreme operating conditions the C802 is capable of accurate temperature self-monitoring and power dissipation control through on-board temperature sensors.

The C802 is available in air-cooled and conduction-cooled versions.



Functional Description

Processor and Bus Architecture

The C802 is a high-performance 3U CompactPCI SBC based on Intel's Calpella platform, and supported by extensive memory arrays. In addition the board's architecture is designed to utilize all bus interfaces to the maximum.

System Architecture

The Calpella platform is based on the Intel® Core™ i7 Processor (Intel's high-performance, low-power mobile processor) and Platform Controller Hub (PCH). This two-chip solution implements the dual core processor, memory controller, and graphics core in a single device, with the PCH providing the platform I/O and display interfaces in a second device.

Core i7 Processor

The Core i7 Processor device provides the host interface controller, system memory interface (DDR3), direct media interface, and integrated graphics engine, and also supports external graphics interfaces (over a PCI Express port). The Core i7 includes two PCIe x8 ports for connectivity to platform devices.

Core i7 is Intel's high performance, low power processor based on the Intel Core micro-architecture with Two Cores/Four Threads (Intel Hyper-Threading® Technology), 32 kB on-die instruction and data L1 caches, a 256 kB on-chip L2 cache, and 4 MB shared L3 cache.

Processor operation speed can be factory configured to 2.53 GHz for high performance, 2.0 GHz for low power, and 1.33 GHz for ultra low power.

Platform Controller Hub (PCH)

The PCH integrates a number of I/O device controllers and interfaces supporting legacy and high-speed resources to allow system design flexibility. The PCH also includes HDMI and RGBHV controllers, which receive their display data from the Core i7 integrated graphics controller over the Intel Flexible Display Interface (Intel FDI), interconnecting the Core i7 device with the PCH.

CompactPCI

The C802 utilizes a PCIe x1 port from the PCH and the Pericom PCIe to PCI Bridge for the CompactPCI backplane interconnection, implementing a standard 32-bit/66 MHz PCI interface in accordance with the PCI specification.

In a CompactPCI subsystem, the C802 is capable of performing either as a system controller or as a peripheral card. As system controller, the C802 supports up to seven additional cards on the PCI backplane, providing them with clock signals and arbitration support.

The C802 PCI interface is universal, supporting both 3.3 V and 5 V PCI signaling levels. It drives 3.3 V signals and is 5 V tolerant.

Memory

The C802 is equipped with large memory arrays providing the user with extensive volatile and non-volatile memory resources. These arrays include up to 4 GB of fast DDR3 (Double Data Rate) SDRAM with error correction (ECC) operating at 1066 MHz, and 4 MB of Flash BIOS.

Flash Disk

A SATA II Flash Disk of up to 64 GB provides on-board mass storage, eliminating the need for externally attached mass-storage media. The Flash Disk is controlled directly from the PCH.

The SATA Flash Disk is soldered on the board for maximum reliability under harsh environmental conditions.

Integrated Graphics Controller

The C802 includes an on-board graphics controller implemented in the Core i7. The graphics core is the Intel Gen 5.75 with 12 execution units, capable of 2D/3D graphics processing, supporting Microsoft DirectX 10 and SGI OpenGL 2.1.

The graphics core implements Intel's Floating Point technology enhancing the visual quality of the generated image.

The C802 provides video output interfaces supporting RGBHV at up to 2048x1536 @ 75 Hz, and single link HDMI/ DVI at up to 1920x 1200 @ 60 Hz with integrated audio.

I/O Interfaces

In addition to its extremely high processing power, the C802 provides a wide variety of I/O capabilities.

Ethernet

Two 10BaseT/100BaseTX/1000BaseT interfaces are implemented in a Dual Gigabit LAN Controller (with integrated PHY) using four of the PCH PCIe lanes.

USB 2.0 Ports

USB Rev. 2.0 host controllers (backward compliant with Rev. 1.0 and Rev. 1.1) integrated in the PCH provide two USB 2.0 ports. The controllers integrate the USB transceivers supporting high-speed, full-speed, and low-speed signaling. The C802 is capable of providing power to downstream devices.

SATA II

A SATA II interface enables connection of external mass storage devices to the C802. The SATA II interface is fully compliant with the Serial ATA 1.0 specification with SATA II extensions, supporting data transfer rates of up to 300 MB/s.

Serial I/O

The C802 provides two UART serial ports supporting full RS-232/422/485 physical interfaces. Serial ports are fully compliant with the 16550 programming model.

Discrete I/O

Up to eight single-ended or four differential general-purpose discrete I/O channels are provided on the C802. 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 channels are divided into four groups, each controlling two signals. Each group may be configured as two single-ended TTL channels or one differential RS-422 channel.

HD Audio

The PCH supports Intel's High Definition (HD) Audio, which is compliant with Microsoft's Universal Audio Architecture (UAA). Using an HD Audio codec, the C802 provides a stereo interface that is software configurable as input or output.

PMC/XMC Expansion

The C802 provides an industry standard expansion slot for extended flexibility and integration of additional elements to the SBC. The expansion site is capable of operating as PMC or XMC.

The PMC site resides on the PCH native 32-bit PCI bus and operates at 33 MHz. The PMC site is universal supporting both 3.3 V and 5 V PCI I/O signaling levels. The slot therefore does not include a voltage key.

The XMC slot connects to the CPU subsystem through a PCIe x8 port. The PCIe interface supports x8, x4, x2 and x1 bus widths and is compliant with PCIe Revision 2.0 at 2.5 GHz.

The XMC slot is fully complaint with VITA 42.

I/O Routing

C802 on-board I/O resources and PMC/XMC I/O are available at the J2 backplane connector.

Due to the limited number of I/O pins available on the J2 connector, it is not possible to simultaneously route all C802 on-board I/O plus all PMC/XMC I/O to the backplane. The C802 is therefore available in several standard factory configured variants providing different combinations of on-board and PMC/XMC I/O. Refer to *I/O Variants* for more information.

For the PMC slot up to 64 I/O lines are routed to J2 while for the XMC slot up to 24 single-ended and 20 differential I/O lines are available.

PMC I/O routing is per PICMG 2.3 R1.0.

Timers

The C802 includes one 32/64-bit and seven 32-bit timers/counters providing high-precision timing functionality. These timers can be chained together (cascaded) to support long timing interval counting applications.

A real-time clock (RTC) provides time and date keeping.

Both standard and windowed (avionics-style) watchdog timers are available on the C802. Implemented in the system FPGA, the watchdog is an avionics-style programmable windowed watchdog timer, which must be serviced within a software programmable window defined by minimum and maximum times. If serviced too early, too late, or not at all, this watchdog timer will generate a timeout event. It may be independently set to generate a non-maskable interrupt or reset the SBC.

Elapsed Time Recorder

An on-board electronic Elapsed Time Recorder (ETR) records cumulative operation time and power on-off cycles in a dedicated NVRAM whenever the C802 is powered. ETR data is software accessible by the user.

Drop-in Compatibility

As a true drop-in replacement for Aitech's C800 SBC, the C802 provides a convenient upgrade path for systems currently using the C800. The C802 delivers increased processing power while retaining the same form factor and identical pinout.

Power consumption of the C802 is the same as or lower than the C800 (depending on processor selection), so there is no need to modify existing systems with regard to thermal management when upgrading to the C802.

Software

Test and Diagnostic Features

The C802 is supplied with a customized BIOS tailored to its architecture, capabilities, and features.

The BIOS includes POST capabilities as well as system configuration options for boot device, boot sequence, etc.

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

Operating Systems

The C802 with its custom BIOS fully supports installation and operation of the following operating systems:

- Microsoft Windows™
- Linux®
- WindRiver VxWorks®

Operating system specific device drivers are provided for all on-board resources, allowing the user to take full advantage of the C802's powerful features.

Support for other operating systems may be available upon request.

Mechanical Features

The C802 is available in both air-cooled and conduction-cooled mechanical formats. Both are single slot 3U modules.

A custom metal frame integral to the conduction-cooled version of the C802 provides excellent rigidity and shock resistance. The frame also provides an array of stiffeners to support rugged PMCs.

Dimensions

- Air-cooled: per PICMG 2.0 R3.0
- Conduction-cooled: per ANSI/VITA 30.1-2002

Weight

Board	Processor		
	1.33 GHz	2.0 GHz	2.53 GHz
1C802-A	300 g (0.66 lbs)	300 g (0.66 lbs)	300 g (0.66 lbs)
2C802-R	330 g (0.73 lbs)	330 g (0.73 lbs)	530 g (1.17 lbs)
4C802-R	330 g (0.73 lbs)	530 g (1.17 lbs)	530 g (1.17 lbs)

Thermal Management

Careful mechanical design, including custom heatsinks combined with a metal frame, allow for optimal heat dissipation and relief of the board. The C802 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 C802 takes all its power from the CompactPCI backplane. It should be provided with +5.0 V, +3.3 V, and ±12 V as defined by the CompactPCI specification (±12 V is required for PMC/XMC compliance only; the C802 does not require ±12 V for its own operation).

All other power sources required by C802 resources are generated on board.

Total power consumption of the C802 depends on its configuration and assembly options.

In its fully featured configuration (no PMC/XMC installed), C802 power consumption with the different processors options, in WindowsXP idle condition and when running the PassMark® BurnInTest (CPU, memory, graphics), is as follows:

Input Voltage	Processor		
	1.33 GHz	2.0 GHz	2.53 GHz
+3.3 V	1.2/1.2 A		
+5.0 V	2.5/4.5 A	2.6/6.1 A	2.6/8.2 A
+12 V	0 A (no PMC/XMC mounted)		
–12 V	0 A (no PMC/XMC mounted)		
Power	16.6/26.5 W	17.0/34.5 W	17.0/45.0 W

* Values are Idle/PassMark

Environmental Features

Please refer to the Aitech Ruggedization datasheet.

Accessories

Optional accessories for the C802 include the TM800 Rear Transition Module (RTM) and the CM900 3U CompactPCI PMC Carrier.

For system integration and other development purposes, the TM800 RTM provides convenient access via standard connectors to all C802 I/O interfaces and all PMC/XMC I/O. The RTM supports both the air-cooled and conduction-cooled versions of the C802 when mounted in a commercial air-cooled chassis.

The CM900 is a 3U CompactPCI PMC carrier on which any industry standard PMC card can be mounted. Using one or more CM900s, system functionality can be significantly expanded by enabling the C802 to control additional PMCs over the CompactPCI backplane.

Please refer to the TM800 and CM900 datasheets for additional information.

C802
Core™ i7 3U CompactPCI SBC

I/O Variants

The C802 is available in several standard configuration variants, providing different combinations of on-board and PMC/XMC I/O.

In addition to the standard variants, custom configurations are available per customer request. For more information, contact an Aitech sales representative.

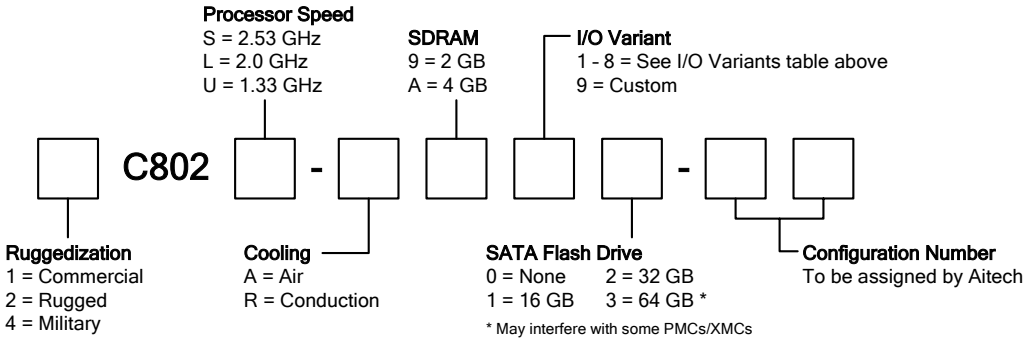
Standard I/O configuration variants are summarized in the table below.

	PMC				XMC			
Variant	**1**	**2**	**3**	**4 ***	**5**	**6**	**7**	**8 ***
Gigabit Ethernet	2	1	0	1	2	1	0	1
Fast Ethernet	0	0	2	0	0	0	2	0
USB 2.0 Ports	2	2	2	2	2	2	2	2
Serial Ports	2	1	2	1	2	1	2	1
Discrete I/O Lines	8	4	4	4	8	4	4	4
RGBHV Output	1	0	0	0	1	0	0	0
DVI Output	1	0	0	0	1	0	0	0
Audio Interface	1	0	0	0	1	0	0	0
SATA II	1	1	0	1	1	1	0	1
PMC/XMC I/O Pins **	12	49	49	64	12	49	49	64

* Variants 4 & 8 operate as peripheral boards only

** Available PMC/XMC I/O pins are listed in the C802 User's Guide

Ordering Information



Example: 4C802L-R961-00

For more information about the C802 or any Aitech product, please contact Aitech Defense Systems sales department at (888) Aitech-8 (248-3248).

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