Stackable PCI Express: The latest in PC/104

The PCI/104-Express & PCIe/104 specifications continue to following the desktop PC and the path provided by the major processor and chipset manufacturers.

- PC/104 supports ISA only

- PC/104-*Plus* supports PCI and ISA

- PCI-104 supports PCI only

- PCI/104-Express supports PCI Express and PCI

- PCIe/104 supports PCI Express only

Epic

Epic defines a mid-size computer board with PC/104 expansion capability. Its size of 6.5" x 4.5" (165mm x 115mm) provides more room for the latest processor chipsets while retaining a relatively small size.

EBX

EBX defines a larger-size computer board with PC/104 expansion capability. The larger size of 8.00" x 5.75" (203mm x 146mm) enables more circuitry to be included on a single board, helping to reduce the number of boards in the system.
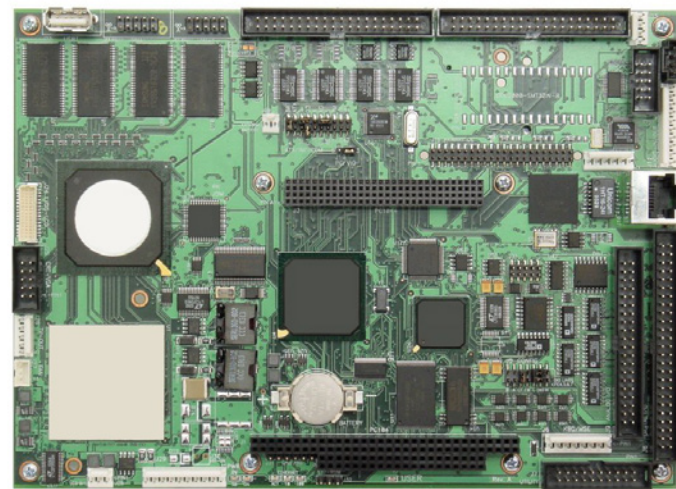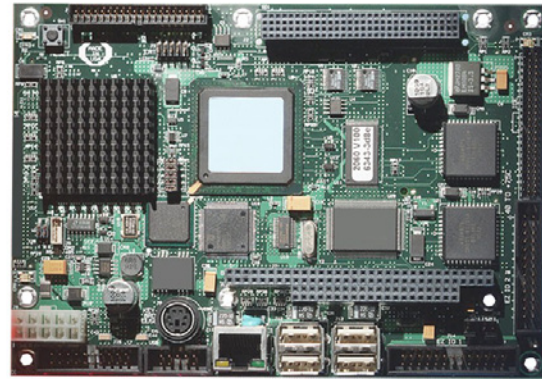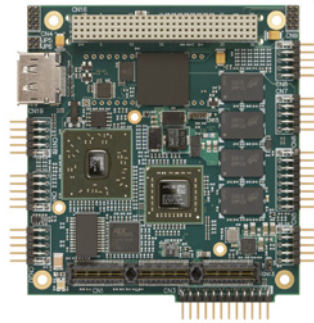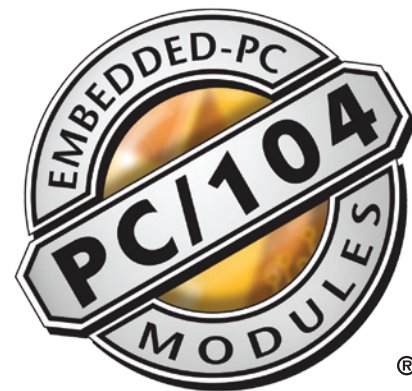
PC/104 Consortium

The PC/104 Consortium is a non-profit trade association founded in 1991 to promote the use of PC/104 technology in embedded computing. It is responsible for maintaining and promoting the PC/104 and related specifications. Membership in the PC/104 Consortium is open to any company involved in the design or marketing of PC/104-related products.

Members are recognized as major players in the embedded market and enjoy the following benefits:

- Use of Trademarked Consortium Logo.
- Help shape the future of embedded market standards.
- Post news and products on PC/104 website.
- Special advertising and trade show offers.
- Visit www.pc104.org for a complete list of levels and benefits

For more information, and a list of current PC/104 members, please contact the Consortium.

PC/104 Consortium
www.pc104.org • info@pc104.org
The PC/104 Consortium provides all specifications for free on its website:
www.pc104.org

What is PC/104?

EMBEDDED-PC PC/104 MODULES

The Rugged Stackable PC Standard for Embedded Computing

PC/104 defines a physical shape and a family of stackable PCI Express, PCI, and ISA expansion buses for compact, low-cost embedded computing applications. It was introduced in 1991 as an expansion method to add I/O to larger size embedded computers. Today, a huge selection of single board computers, I/O cards, and peripheral modules are available in the PC/104 form factor. Over 60 companies around the world offer CPUs, I/O boards, packaging, and accessories for PC/104, creating a healthy industry that provides a wide array of choices for embedded systems designers.

The heart of PC/104 architecture is its stacked-board technique. The expansion buses are implemented using stacking connectors that enable boards to plug directly on top of each other. This creates a rugged method of building an embedded system from board-level components without the need for a backplane.

In addition to the PC/104 form factor, other physical shapes and sizes of computer boards are available that support PC/104 expansion. The two most popular and widely supported formats are EBX and Epic, and there are many others as well.

Military

Industrial

Medical

Transportation

Advantages of PC/104

PC/104 offers many valuable benefits to embedded systems designers:

- **Small size** At approximately 3.6" x 3.8" (90mm x 96mm), **PC/104** is the smallest open standard for embedded computers supported by multiple vendors around the world. **PC/104** is perfect for portable systems or applications where space is limited.

- **Rugged by design** **PC/104** eliminates the backplane and replaces it with a rugged stacking expansion bus. Boards are held together with a four-corner mounting system. The combination of these features results in an extremely rigid multi-board system that can withstand shock and vibration, making **PC/104** particularly popular in vehicle and military and other demanding applications.

- **PC technology** **PC/104** is based on popular PC technology, including processors, support chips, expansion buses, operating systems, and software development tools. **PC/104** board designers can easily take advantage of the latest and most popular technologies, in turn making these technologies available to **PC/104** users.

- **Low cost** **PC/104** systems are substantially lower cost than other embedded computing standards because of their smaller size and elimination of the backplane. **PC/104** makes embedded computing technology accessible to a larger number of applications.

- **Multi-vendor support** **PC/104** is an open standard and companies from all across the globe build to its specifications. **PC/104** provides a reliable platform for embedded systems designers concerned with long product life and availability of features. You can mix and match boards from multiple vendors and upgrade processors to achieve higher performance when needed.
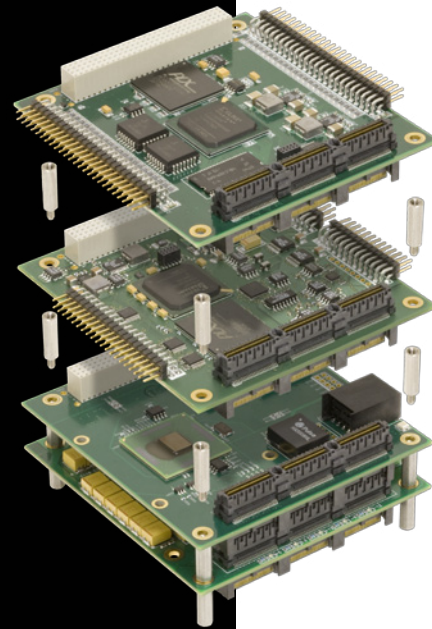
PC/104 Specifications
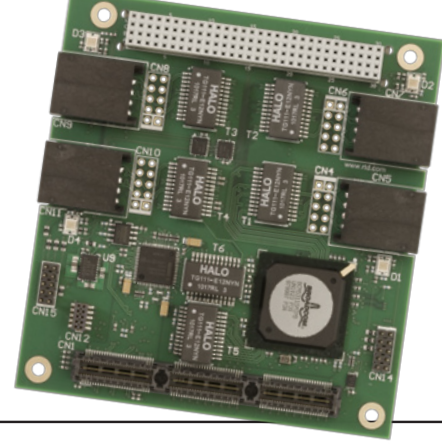
The PC/104 Consortium maintains the **PC/104**™, **PC/104-*Plus***™, and **PCI-104**™ specifications on the 104™ form factor as well as the specifications for the **EPIC**™ and **EBX**™ form factors.

PC/104 is the original specification. It defined the 104 form factor at 3.550 x 3.775 inch (90.17 x 95.89 mm) with a stacking ISA bus. There are 8-bit (XT) and 16-bit (AT) versions.

PC/104-*Plus* added PCI bus to classic PC/104 on the 104 form factor. 132MBytes per second transfer rate made high speed processing possible in rugged embedded systems while the ISA bus allowed use of the extensive infrastructure of embedded modules.

PCI-104 actually existed in the **PC/104-*Plus*** specification, but it didn't have a name. Instead of calling it "PC/104-*Plus* PCI only" forever, the consortium decided to give it its own specification and **PCI-104** was born with only a PCI bus on the 104 form factor.

PCIe/104™ and **PCI/104-Express**™ specifications establish a standard to use the high speed PCI Express® bus in stackable, modular embedded applications.

EPIC and **EPIC Express** (Embedded Platform for Industrial Computing) defines a format for mid-sized single board CPUs. At 4.528 x 6.496 inches (115.00 x 165.00 mm), it is larger than the 104 form factor and allows room for tall cooling solutions for high end processors with space for standard PC style I/O connectors.

EBX and **EBX Express** (Embedded Board, eXpandable) are the original 5¼ inch form factor of many single board computers. At 5.750 x 8.000 inches (146.05 x 203.20 mm) it has room for a complete computer with standard I/O and memory DIMMs but still features **PC/104-*Plus*** or **PCI/104-Express** expansion for flexibility and expandability.
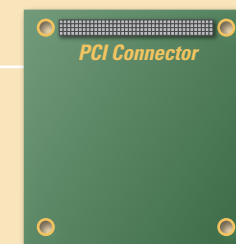
PC/104 Bus Evolution

PC/104 stackable embedded PCs have followed the desktop PC leveraging on the hardware and software support developed for this popular platform.
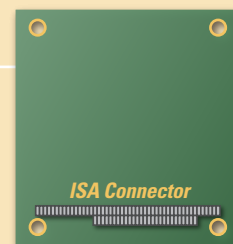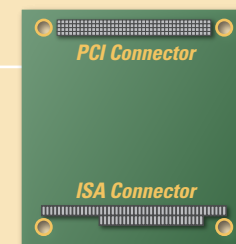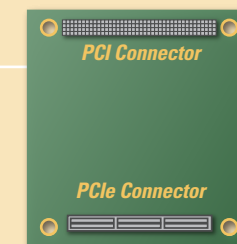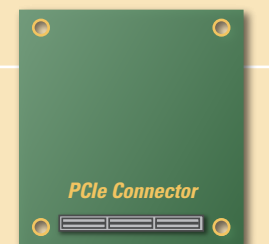
| PC/104 | PC/104-*Plus* | PCI-104 | PCI/104-Express | PCIe/104 |