

## PMC and XMC Modular I/O

### Established Standards in High Performance Systems

The IEEE standard for PCI Mezzanine Cards (PMCs) initiated the first successful approach to truly modular I/O devices. Implementation of the protocol has created a healthy marketplace, with multiple suppliers, rich product offerings, and competitive economics. Financial viability has spurred widespread acceptance and significant refinement of the mezzanine-card concept.

Subsequent development has presented system integrators with the XMC version, introducing support for switched interconnect protocols, adding serial lanes for high-speed data transfer, and providing better definition for carrier cards.

#### Modular Options, Performance and Savings

System integrators can choose from hundreds of PMC modules available from a wide variety of manufacturers. Based on the standard PCI interface used in personal computers, PMC modules are the most popular modular I/O standard and provide effective economical solutions for a broad range of embedded computing and high-performance control systems. Supported by the tremendous installed base of PCI in the PC universe, and its familiarity within the development community, economies of scale have tipped the price/performance balance in favor of established PMC and XMC solutions for functions such as A/D and D/A conversion, discrete level control, frequency measurement, and communications. PMC modules are widely available to perform a great number of analog, digital, counter/timer, and serial I/O tasks.

The latest advance takes advantage of FPGAs (Field Programmable Gate Arrays) to simplify development and deployment of upgrades in computer controlled systems ranging from aerospace actuators to industrial controllers. An FPGA is an integrated circuit that enables configuration after manufacturing – by the designer or customer. The FPGA's ability to implement any ASIC logic function, relatively low non-recurring engineer cost and the post-manufacturing update functionality provides numerous advantages for many applications.



**Acromag FPGA PMC card** enables reconfigurable high performance I/O processing and user-customizable computing for video, 3D data, radar/sonar, software-defined radio, electronic warfare, floating-point math and fuzzy logic algorithm applications.

## XMC – The Next Generation

The XMC board is the same size as the PMC board. However, XMC utilizes the PCIe bus that is native on many CPU boards and eliminates the need for a PCIe to PCI bridge chip. Combined with the selection of x1, x4, x8 or x16 serial lines, XMC enables the board designer to achieve higher bandwidth.

Some military designers prefer the Serial RapidIO (SRIO) bus instead of PCIe. SRIO is commonly used in high bandwidth, low latency applications to connect clustering networks of peer to peer embedded processors. Its topology allows for functional partitioning into field replaceable units and is also well suited for hot-swap applications.

### Summary

PMC and XMC modules will continue to deliver high performance and savings in mature, well-characterized systems that depend on accurate, reliable data input such as defense, aerospace, and scientific applications.

Both PMC and XMC are particularly well suited to durable operation in harsh environments, including situations that see extended temperature ranges and exposure to extreme weather conditions.

As other promising standards come and go, PMC and XMC standards provide a stable proven platform where the challenges are better understood, product life-cycles are longer, and budgets are tighter. PMC and XMC I/O modules will continue to provide dependable results from a wide selection of Commercial Off-The-Shelf (COTS) options at reasonable prices.



**PMC and XMC standards** are used in numerous precision and high performance I/O applications