

PEX 8649 Highlights

- **PEX 8649 Vitals**
 - 48-lane, 12-port PCIe Gen 2 switch
 - Integrated 5.0 GT/s SerDes
 - 27 x 27mm², 676-ball FCBGA package
 - Typical Power: 6.74 Watts

- **PEX 8649 Key Features**
 - **Standards Compliant**
 - PCI Express Base Specification, r2.0 (backwards compatible w/ PCIe r1.0a/1.1)
 - PCI Power Management Spec, r1.2
 - Microsoft Vista Compliant
 - Supports Access Control Services
 - Dynamic link-width control
 - Dynamic SerDes speed control
 - **High Performance**
 - ◆ **performancePAK**
 - ✓ Read Pacing (bandwidth throttling)
 - ✓ Multicast
 - ✓ Dynamic Buffer/FC Credit Pool
 - Non-blocking switch fabric
 - Full line rate on all ports
 - Packet Cut-Thru w/ 176ns max packet latency (x16 to x16)
 - 2KB Max Payload Size
 - **Flexible Configuration**
 - Ports configurable as x1, x2, x4, x8, x16
 - Registers configurable with strapping pins, EEPROM, I²C, or host software
 - Lane and polarity reversal
 - Compatible with PCIe 1.0a PM
 - **Multi-Host & Fail-Over Support**
 - Configurable Non-Transparent (NT) port
 - Failover with NT port
 - Up to Eight upstream/Host ports with 1+1 or N+1 failover to other upstream ports
 - **Quality of Service (QoS)**
 - Eight traffic classes per port
 - Weighted round-robin source port arbitration
 - **Reliability, Availability, Serviceability**
 - ◆ **visionPAK**
 - ✓ Per Port Performance Monitoring
 - Per port payload & header counters
 - ✓ SerDes Eye Capture
 - ✓ Error Injection and Loopback
 - 4 Hot-Plug Ports with native HP Signals
 - All ports hot-plug capable thru I²C (Hot-Plug Controller on every port)
 - ECRC and Poison bit support
 - Data Path parity
 - Memory (RAM) Error Correction
 - INTA# and FATAL_ERR# signals
 - Advanced Error Reporting
 - Port Status bits and GPIO available
 - Per port error diagnostics
 - JTAG AC/DC boundary scan

Application:

Backplane Application in Embedded Systems

PLX Products:

PEX8649 – 48-lane, 12-port PCIe Gen 2 Switch

PEX 8609 – 8-lane, 8-port Gen 2 Switch

Key Benefit:

High Lane/Port Count Fan-Out

Embedded Applications

Embedded systems are application specific systems which are in many instances placed in rugged environments. Their size, form factor and durability have made them popular in many markets including commercial, industrial, medical, telecommunications and military. For over 25 years, protocols such as VME and PCI have been key in the deployment of these systems. In the past, performance has taken a backseat to reliability and durability in these applications. However, the increasing technological advancement in these markets coupled with the ubiquitous nature of PCI then, and PCI Express now, are driving innovation in the platforms used. This ExpressApp will focus on how PCI Express switches are essential to the backplane designs of two popular platforms -- VPX and mTCA.

What is VPX?

VPX, formerly known as VITA 46, is an ANSI standard which is based on the VME bus and provides switch fabric extension support over a defined high-speed connector. These efforts are coordinated by the VME International Trade Association (VITA). The VITA specification for PCI Express is VITA 46.4. See figure 1 for an example of a VPX system.



Figure 1

What is mTCA?

mTCA is an effort lead and coordinated by the PICMG which defines a COTS chassis which allows standard Advanced Mezzanine Cards (AMC) to be used and function without any AdvancedTCA (ATCA) carrier card. An ATCA card can be 12U or 13U in height and can house multiple AMC modules at once. An mTCA chassis on the other hand can directly support 3U/6U AMC cards without the need of any carrier card. See figure 2 for an example mTCA chassis and AMC card.



Figure 1

The Embedded CPU

Embedded systems target “mission critical” applications, that is, applications with high reliability requirements such as those implemented in communications and military systems. However, the advances in the embedded CPU have provided additional uses which take advantage of the VPX and mTCA form factors. Performance advances in the core capabilities have increased dramatically, but almost as important is the implementation of PCI Express in embedded CPUs. The PCIe high speed interface has forced the VITA and PICMG workgroups to define and support high speed connectors on their backplanes. This in turn has allowed other applications, such as HPC, to take advantage of the small form factors without sacrificing performance.

The PLX PEX 8649 is a 48-Lane PCI Express Gen 2 switch which supports up to 12 ports each at a x4 link width. Its small package and low power make it an ideal choice for VPX and mTCA backplane applications. Furthermore, the PEX 8649 implements multicast, a feature which is beneficial in HPC applications as well as communications systems.

Figure 3 shows an example of an HPC backplane. The PEX 8649 provides the backplane connectivity between each of the

system blades. The figure also shows a second switch (the PEX 8609) on each of the blades. The PEX 8609 is used to isolate the local address domain from the other blades in the system by enabling the non-transparent function. Additionally, the PEX 8609 implements a built-in DMA engine which can be utilized by the local blade to transfer data between blades at a high rate.

The Non-Transparent port in the PEX 8609 provides address translation windows for direct memory placement to the other blades. This makes it an attractive solution for applications which require low latency transfers between blades.

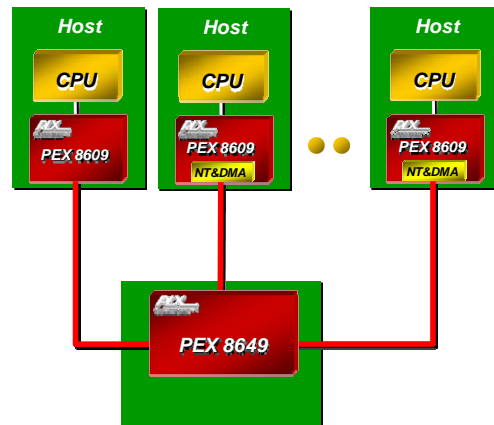


Figure 2

Additional PLX Advantages

The Non-Transparent port in the PEX 8609 is a generic PCIe endpoint. Software can be written on top of the NT hardware to provide additional functionality. Furthermore, all of PLX’s PCIe Gen 2 Switches are loaded with features targeted at enhancing overall system performance as well as debug capabilities. These features are part of PLX’s *performancePAK* and *visionPAK* as listed below:

performancePAK

- Multicast
- Dynamic buffer/FC credit pool
- Read Pacing

visionPAK

- SerDes Eye Width Capture
- Per Port Performance Monitoring
- Error Injection & Loopback

Available on PLX Website:

www.plxtech.com/8649 and www.plxtech.com/8609

- Product Brief, Databook, Application Notes, Technical Support