

# Product Brief

## Intel® 41110 Serial to Parallel PCI Bridge

Embedded Computing



# Intel® 41110 Serial to Parallel PCI Bridge

## Product Description

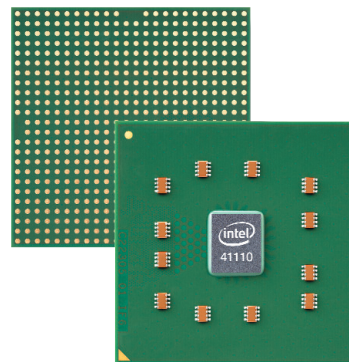
Conceived as a low-cost bridge chip solution for connecting legacy PCI\* and PCI-X\* devices to new generation PCI Express\* serial interconnect host systems, the Intel® 41110 Serial to Parallel PCI transparent bridge chip is ideal for quick time-to-market (TTM) porting of existing or new PCI and PCI-X add-in card layout designs to PCI Express cards compatible with PCIe host system slots.

The Intel 41110 is a *forward* bridge (i.e., root complex/host side is PCI Express) that can be configured in PCI Express x1, x4 or x8 bi-directional lane width upstream links to host PCI Express slots or connectors. A single 133 MHz, 64-bit wide parallel PCI-X bus segment is provided on the 41110 bridge's secondary, card side for attaching legacy 33/66 MHz PCI or newer 66/100/133 MHz PCI-X chip devices.

The 41110 is optimized for embedded computing card solutions requiring quick TTM lay-out design/porting, lower BOM costs and fewer development resource requirements. Examples include PCI Express 1.0b standard add-in cards: AMCs, blade cards, PCI Express (PIC MG) backplanes or PMCs and other mezzanine cards. Such usage models demand reliable, stable and prolonged life PCI Express bridge chip solutions where extended product lifecycle management, robust performance, high quality and ROI investment protection are prime concerns.

With the 41110, developers can “*extend*” the useful life of legacy PCI and PCI-X devices ASICs applicability to the industry's newer, faster and higher bandwidth PCI Express host chipset platforms and systems.

Featuring support for up to six bus masters, the 41110 Serial to Parallel PCI bridge chip's PCI-X bus segment can accommodate multiple devices per PCI v 2.3 and PCI-X v 1.0b mode 1 standards. The result is a versatile, low-cost bridge chip for both embedded/industrial and general purpose “open” computing platforms for rapid design, prototyping and development of new PCI Express cards.



## Key Applications

The 41110 PCI bridge translates from serial PCI Express I/O architecture to PCI-X or PCI parallel bus architecture. It enables quick and relatively simple time-to-market porting of existing or new PCI add-in cards, PIC MG, PMCs, AMCs, HBAs or any other custom add-in cards planned for PCI Express host system connectivity. This allows developers to take immediate advantage of PCI Express technology and high performance server and desktop platforms that the industry is rapidly embracing. Applications include Direct Attached Storage (DAS), Networked Attached Storage (NAS), Storage Area Networking (SAN), RAID, networking, network interface cards (NIC), graphics, imaging and multi-media HBA or any other add-in cards equipped with a PCI or PCI-X interface. With the 41110, hardware vendors can maximize their product's available market by porting their PCI/PCI-X-based add-in cards to high-performance, serial PCI Express system/slot architecture. The ability to plug in these ported PCI/PCI-X cards directly into PCI Express slots using the 41110 (instead of a standard PCI-X slot) will also provide hardware vendors with performance advantages (i.e., direct PCI Express port attach)

## Key Applications (continued)

over traditional “bridged” PCI-X slots on PCI Express systems. In short, the 41110 enables vendors to “bridge” their applications to PCI Express architecture as an interim product transition step until native mode PCI Express device-based applications are deployed. Alternately, vendors can elect to retain use of existing/legacy PCI chip devices and

ASICs for extended periods to maximize ROI and investment protection of their technology and installed base – particularly where legacy connectivity is a higher concern/priority than higher throughput bandwidth.

Figure 1: Block Diagram

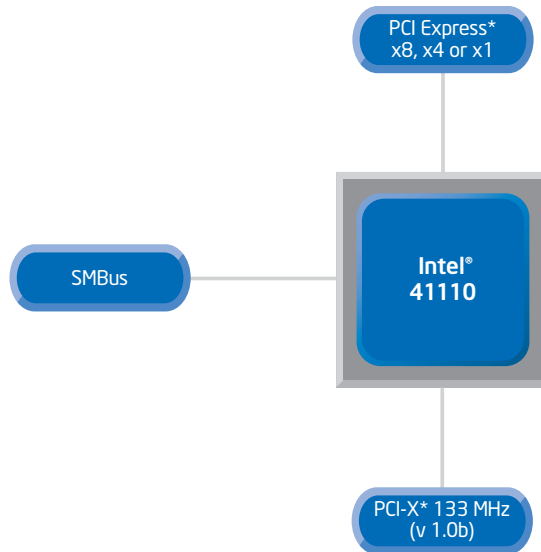
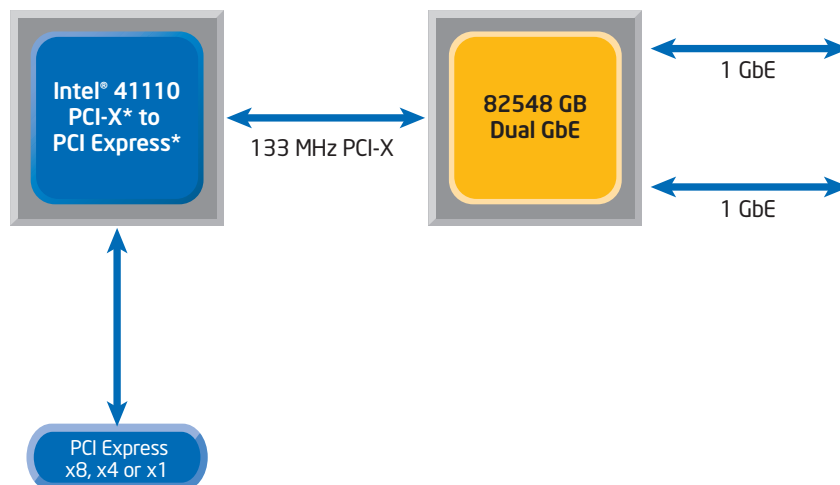


Figure 2: 41110 Usage Model Example



## Intel Advantage

The 41110 PCI Express to PCI-X transparent bridge comes from a long and rich heritage of PCI bridging products pioneered by the Intel Corporation. Millions upon millions of PCI-based bridges have been sold by Intel to date. In addition, the 41110 offers hardware vendors the assurance and advantages of extensive quality, interoperability and validation testing with existing Intel® platforms and PCI Express products. Further, Intel's worldwide product distribution and technical support is second to none. The Intel

41110 has many specific product features and advantages, and is particularly well-suited for parallel PCI-based legacy device "connectivity" requirements to PCI Express serial interconnect enabled systems/slots. Hardware vendors benefit from powerful capabilities and maximum design flexibility when laying out and porting board designs to PCI Express – since the 41110 provides the PCI Express conversion and interface.

### Features

### Benefits

Single x8, x4 or x1 port PCI Express* upstream interface	▪ Provides 4 GB/sec, 2 GB/sec or 500 MB/sec bi-directional throughput capability, respectively for a choice of high upstream bandwidth transfer rates to/from PCI Express enabled systems
One independent 64-bit PCI*/PCI-X* downstream bus segment	▪ Supports up to 1 GB/sec per segment (64-bit, 133 MHz PCI-X v 1.0b, mode 1) per segment PCI (64-bit, 66 MHz PCI v 2.3)
Opaque Memory Mode	▪ Provides "semi-transparent" operation using private device and /or Private memory address space
Arbiter support for up to 6 bus masters on a PCI or PCI-X bus segment	▪ Allows ample device attach capability for multi-chip, multi-function cards
256B maximum payload size	▪ Enables efficient data transfer performance characteristics and reduced latency
31x31 mm BGA	▪ Standard FC BGA packaging
PCI Express Hot Plug Capable	▪ No disruption to host system platform when inserting or removing PCI Express add-in cards in a hot plug slot
SMBus port	▪ For initializing the 41110 or modifying its registers from the secondary PCI/PCI-X bus segment side using an I <sup>2</sup> C master device
Backwards compatibility with PCI v 2.3	▪ Supports 64-bit PCI-X 133 MHz, 100 MHz and 66 MHz as well as 64-bit and 32-bit PCI 66 MHz and 33 MHz bus modes and frequency operation
Register configuration software utility	▪ Allows customization of configuration register start-up values and optimization of memory space in I <sup>2</sup> C microcontroller initialization device via an easy to use GUI

## Intel Access

Embedded Intel® Architecture Home Page: [intel.com/design/intarch](http://intel.com/design/intarch)  
Developer's Site: [developer.intel.com](http://developer.intel.com)  
Intel in Communications: [intel.com/communications](http://intel.com/communications)  
General Information Hotline: (800) 628-8686 or (916) 356-3104 5 a.m. to 5 p.m. PST  
Intel® Literature Center: (800) 548-4725 7 a.m. to 7 p.m. CST (U.S. and Canada)  
[International locations please contact your local sales office.](#)

INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL® PRODUCTS. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER, AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY RELATING TO SALE AND/OR USE OF INTEL PRODUCTS, INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT, OR OTHER INTELLECTUAL PROPERTY RIGHT. INTEL MAY MAKE CHANGES TO SPECIFICATIONS, PRODUCT DESCRIPTIONS, AND PLANS AT ANY TIME, WITHOUT NOTICE.

Intel Corporation may have patents or pending patent applications, trademarks, copyrights, or other intellectual property rights that relate to the presented subject matter. The furnishing of documents and other materials and information does not provide any license, express or implied, by estoppel or otherwise, to any such patents, trademarks, copyrights, or other intellectual property rights. Intel products are not intended for use in medical, life saving, life sustaining, critical control or safety systems, or in nuclear facility applications. The Intel® 41110 Serial to Parallel PCI Bridge may contain design defects or errors known as errata, which may cause the product to deviate from published specifications. Current characterized errata are available upon request.

Copyright © 2006 Intel Corporation. All rights reserved.

Intel, the Intel logo, Intel. Leap ahead., and Intel. Leap ahead. logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

\*Other names and brands may be claimed as the property of others.

