TEXAS INSTRUMENTS
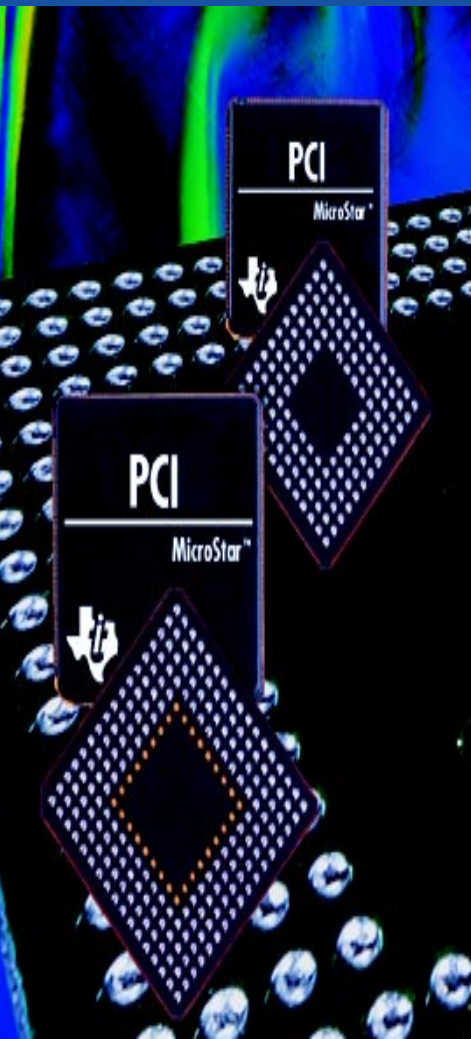
The world leader in CardBus and 1394 solutions

PCIBus Solutions

Family Overview
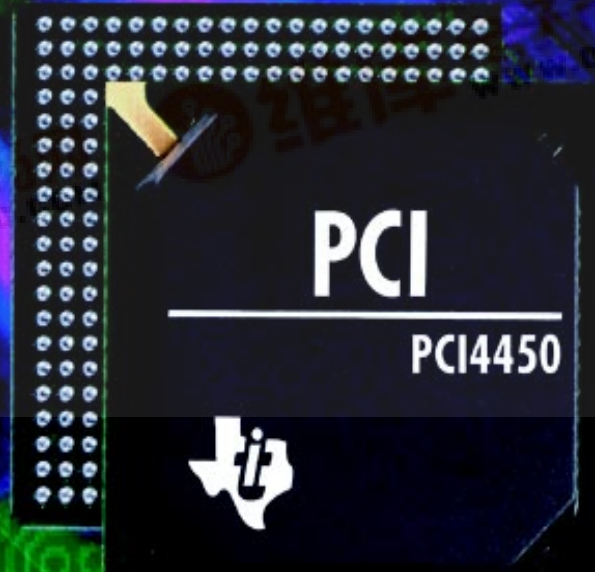
PCIBus
Solutions

TI PCIBus mission To add value to our customers' products by ensuring the highest level of quality, reliability, cost effectiveness, product services, and fastest time to market with the latest technology.

TI PCIBus strategy Leverage world-class manufacturing capability, leadership semiconductor process, and packaging technology to provide high-quality, affordable PCI solutions.

TI's PCI CardBus Controllers are the industry's preferred CardBus solution. TI is continually working to develop and implement the latest industry standards. TI provides 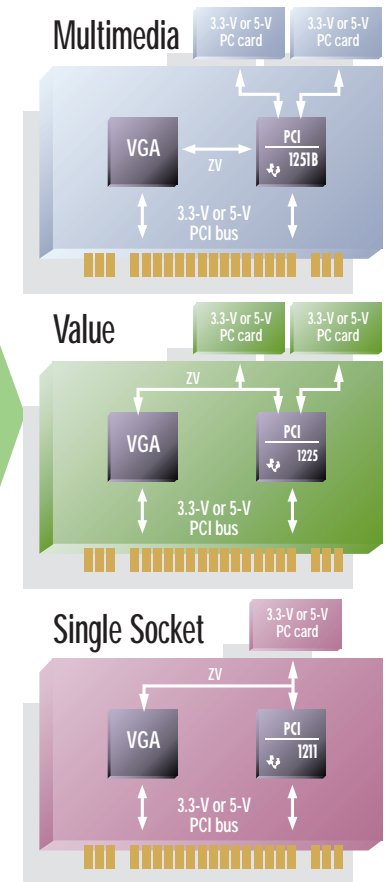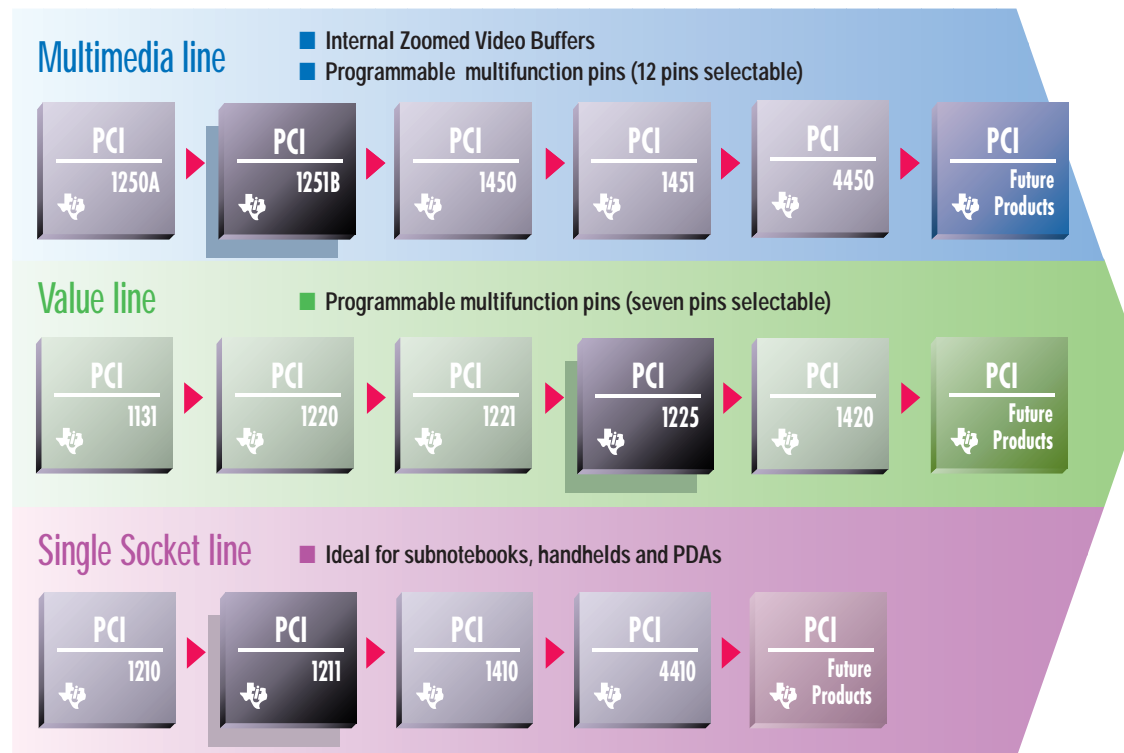an extensive roadmap into the future to meet changing industry requirements. Extensive CardBus experience and industry leadership make TI

TI's PCI CardBus product family and roadmap

Multimedia line
- Internal Zoomed Video Buffers
- Programmable multifunction pins (12 pins selectable)

PCI 1250A → PCI 1251B → PCI 1450 → PCI 1451 → PCI 4450 → PCI Future Products

Value line
- Programmable multifunction pins (seven pins selectable)

PCI 1131 → PCI 1220 → PCI 1221 → PCI 1225 → PCI 1420 → PCI Future Products

Single Socket line
- Ideal for subnotebooks, handhelds and PDAs

PCI 1210 → PCI 1211 → PCI 1410 → PCI 4410 → PCI Future Products

Multimedia
3.3-V or 5-V PC card | 3.3-V or 5-V PC card
VGA — ZV — PCI 1251B
3.3-V or 5-V PCI bus

Value
3.3-V or 5-V PC card | 3.3-V or 5-V PC card
ZV
VGA — PCI 1225
3.3-V or 5-V PCI bus

Single Socket
3.3-V or 5-V PC card
ZV
VGA — PCI 1211
3.3-V or 5-V PCI bus

Family feature progression

PCI11xx
- The industry's first PC '97 compliant device
- First CardBus controller to obtain Windows '95 logo

PCI12xx
- High performance pipelined FIFOs
- PCI/ACPI compliant CardBus
- Supports Wake on LAN from power state D2 or higher
- PCIBus Power Management Interface Spec 1.0 Compliance
- PC 98/99 Compliance
- 1997 PC Card Standard Compliance
- MicroStar BGA Chip Scale Packaging available

PCI14xx
- PCI12xx features PLUS:
- PCI Power Management for CardBus
- Supports Wake on LAN from power state D3 or higher
- Backwards compatibility with 12xx series

PCI44xx
- PCI14xx features PLUS:
- Integrated CardBus and 1394 Link Layer controller
- Supports Wake on LAN from power state D3 or higher

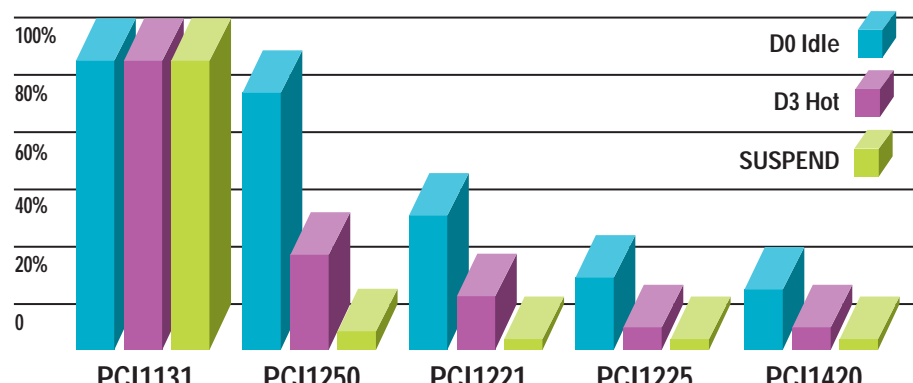# PCIBus Solutions

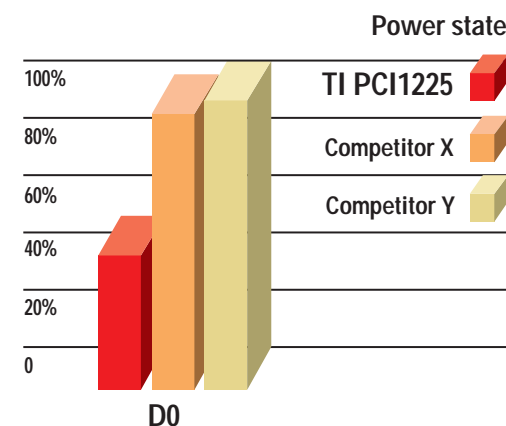## Keeping power consumption on track

How TI PCIBus Controllers are setting the benchmark for reducing power consumption:

- Power consumption of TI's CardBus controllers has dropped 87 percent since 1997

- In D0 Idle states, power consumption of the PCI1420 (newest CardBus controller) is 21 percent of the PCI1220/1250

- TI leads the industry in power reduction

The trend toward reducing power consumption

	D0 Idle
	D3 Hot
	SUSPEND

100%
80%
60%
40%
20%
0

PCI1131   PCI1250   PCI1221   PCI1225   PCI1420

How TI stacks up

Power state

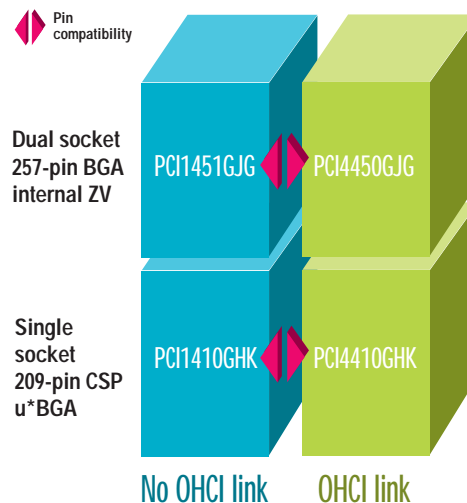|	
	TI PCI1225
	Competitor X
	Competitor Y

100%
80%
60%
40%
20%
0

D0

TI's committment to
excellence is demonstrated
by the PCI4450, the
industry's first combined
CardBus and 1394a Open
Host Controller Interface
(OHCI) link layer controller
integrated into a single chip.
TI provides a total system
solution for high-speed
mobile connectivity, enabling
the consumer for current and

TI's PCI4450 and PCI4410

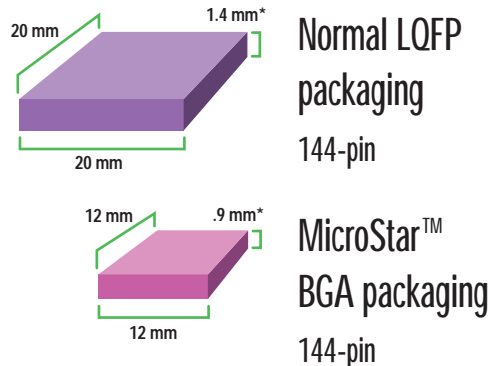## CB/OHCI controller upgrades
(MicroStar only)

◆ Pin compatibility

Dual socket
257-pin BGA
internal ZV

| PCI1451GJG | ◆ | PCI4450GJG |

Single socket
209-pin CSP
u*BGA

| PCI1410GHK | ◆ | PCI4410GHK |

No OHCI link   OHCI link

Bringing 1394 to the mobile market

- ■ The industry's first combined CardBus and 1394 OHCI Link Layer Controller

- ■ Enables mobile solutions with the latest in reliable, high-speed interface technology

- ■ Significantly reduces the space, power and PCIbus loading required for implementing leading-edge mobile platforms

- ■ Multiple upgrade paths for design flexibility

PCIBus Solutions

The leader in packaging innovations...

20 mm × 20 mm, 1.4 mm*

Normal LQFP packaging
144-pin

12 mm × 12 mm, .9 mm*

MicroStar™ BGA packaging
144-pin

* Not including leads or balls

... and compatibility testing

TI's MicroStar™ BGA — Chip Scale Packaging (CSP) solution — allows designers to shrink board size without increasing the number of layers. Here's how:

- Packaging that's only 25 percent of the size of normal LQFP packaging
- Height reduction of .9 mm from traditional BGA packaging and .4 mm from LQFP packaging
- Weight that's only 30 percent of the normal LQFP packaging
- Three package offerings
- Thermal performance

The result?
Thinner and lighter notebook computers.

Why TI leads the way in compatibility testing:

- More than four years of true customer CardBus experience combined with exhaustive testing — for compatibility now and in the future
- Extensive support for notebook designers
- Comprehensive in-house testing lab
- Testing that includes over 300 unique cards, and growing
- Continued investment in new PC cards to ensure ultimate compatibility
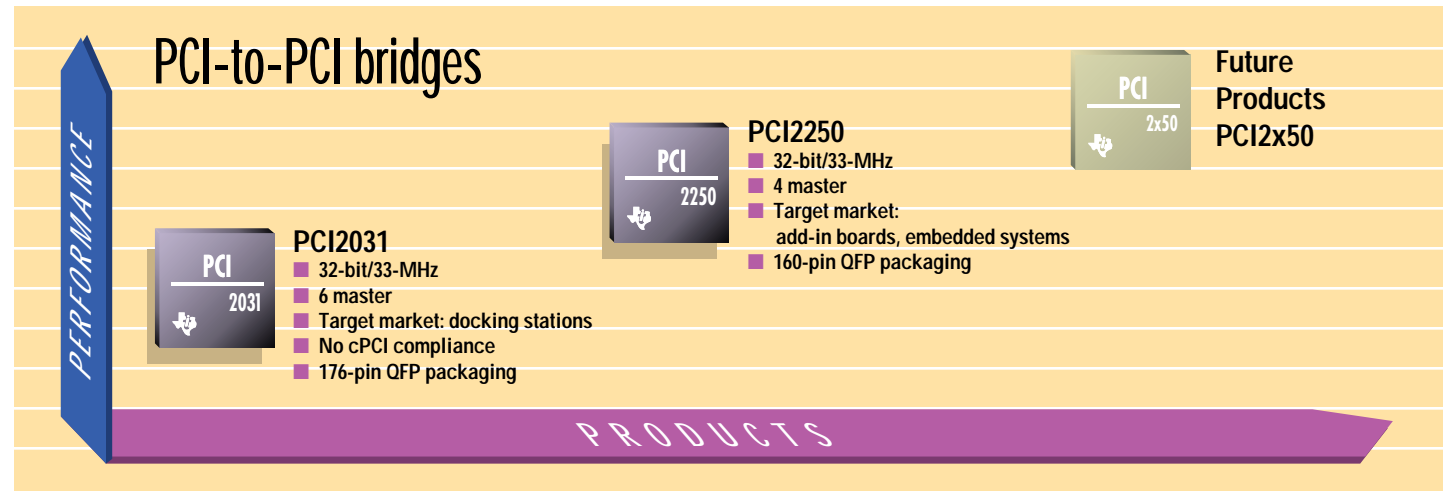
TI's bridge product lines include PCI-to-PCI bridges, PCI-to-DSP bridges and advanced PCI bridges. These products leverage off TI's experience with PCI-based products, including the PCI2031, a general-purpose PCI-to-PCI bridge primarily used for mobile applications. TI has more than two years of market presence and design-ins in the PCI bridge market
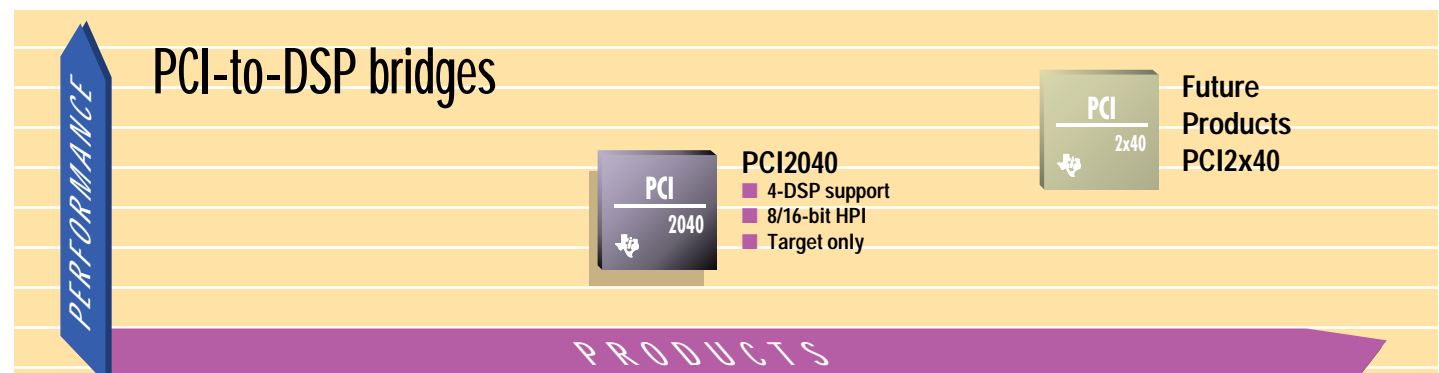
PCI bridge products

PCI-to-PCI bridges for servers, embedded and industrial PCI systems and Advanced PCI bridge products for high connectivity PCI systems

- PCI Local Bus Specification R 2.2. compliance
- Compact PCI Hot-Swap Specification R 1.0 compliance
- PCI-to-PCI Bridge Specification R 1.1 compliance

PCI-to-PCI bridges

PERFORMANCE

PCI 2250

PCI2250
- 32-bit/33-MHz
- 4 master
- Target market: add-in boards, embedded systems
- 160-pin QFP packaging

PCI 2x50

Future Products PCI2x50

PCI 2031

PCI2031
- 32-bit/33-MHz
- 6 master
- Target market: docking stations
- No cPCI compliance
- 176-pin QFP packaging

PRODUCTS

PCI-to-DSP bridges for DSP applications

- Useful in a variety of applications that involve multiple DSPs
- Glueless interface to TMS320C54x/C6x DSPs
- Compact PCI Hot-Swap Specification R 1.0 compliance

PCI-to-DSP bridges

PERFORMANCE

PCI 2x40

Future Products PCI2x40

PCI 2040

PCI2040
- 4-DSP support
- 8/16-bit HPI
- Target only

PRODUCTS

PRODUCT SUMMARY

Dual-socket CardBus with Internal ZV

Device	Spec compliance	Features
PCI1250A • GFN	• ACPI/PCI PM1.0 • Device Class PM 1.0 • PC99 ready • PCI 2.2 support	• All 12xx/14xx controllers use TPS2216 • Internal Zoom Video Buffers • 8-way legacy IRQ multiplexer • 4 GP I/Os
PCI1251B • GFN • GJG	• ACPI/PCI PM1.0 • Device Class PM 1.0 • PC99 ready • PCI 2.2 support	• Enhancements to '1250A • Power reduction from PCI1250A
PCI1450 • GFN • GJG	• New CardBus Device Class PM • ACPI/PCI PM1.0 • PC99 ready • PCI 2.2 support	• Supports new PCI PM for Cardbus • Enhanced ZV • Enhancements to PCI1251
PCI1451 • GPG	• Same as PCI1450	• Same as PCI1450 • Available in u* only (CSP)
PCI4450 • GFN • GJG	• New CardBus Device Class PM • ACPI/PCI PM 1.0 • PC99 ready • PCI 2.2 support	• Integrated CardBus/1394 Link Controller

Key to package designators

Designator	Package	Package dimensions[3]
GFN GJG	• 256-pin BGA • 257-pin u*BGA	• 27x27x2.1 mm • 16x16x1.2 mm
PDV GHK	• 208-pin LQFP • 209-pin u*BGA	• 28x28x1.6 mm • 16x16x1.2 mm
PGE PBW GGU	• 144-pin LQFP • 144-pin LQFP • 144-pin u*BGA	• 20x20x1.6 mm • 16x16x1.35 mm • 12x12x1.2 mm

Important Notice: The products and services of Texas Instruments and its subsidiaries described herein are sold subject to TI's standard terms and conditions of sale. Customers are advised to obtain the most current and complete information about TI products and services before placing orders. TI assumes no liability for applications assistance, customer's applications or product designs, software performance, or infringement of patents. The publication of information regarding any other company's products or services does not constitute TI's approval, warranty or endorsement thereof.

To know more about TI PCI Solutions, see: www.ti.com/sc/pci

Dual-socket CardBus with External ZV

Device	Spec compliance	Features
PCI1131 • PDV	• PCI 2.1 compliant • PC97 certified	• Not recommended for new design-ins
PCI1220 • PDV	• ACPI/PCI PM 1.0 • Device Class 1.0 • PC99 ready • PCI 2.2 support	• All 122x/14xx controllers use TPS2216 Power Switch • PCI PM • Multifunction routing pins • Serial EEPROM interface
PCI1221 • PDV • GHK	• ACPI/PCI PM 1.0 • Device Class 1.0 • PC99 ready • PCI 2.2 support	• Lower power consumption than PCI1220 • DMA not supported
PCI1225 • PDV • GHK	• ACPI/PCI PM 1.0 • Device Class 1.0 • PC99 ready • PCI 2.2 support	• Lower power consumption than PCI1221 • DMA supported
PCI1420 • PDV • GHK	• New CardBus Device Class PM • ACPI/PCI PM 1.0 • Device Class 1.0 • PC99 ready • PCI 2.2 support	• DMA supported • Supports new PCI PM for CardBus

Single-socket CardBus with external ZV

Device	Spec compliance	Features
PCI1210 • PGE • PBW • GGU	• ACPI/PCI PM 1.0 • PC99 ready • Device Class PM 1.0 • PCI 2.2 support	• All Single Socket TI's controllers use TI's TPS2211 Power Switch
PCI1211 • PGE • PBW • GGU	• ACPI/PCI PM 1.0 • PC99 ready • Device Class PM 1.0 • PCI 2.2 support	• Lower power consumption than PCI1210
PCI1410 • PGE • GGU • GHK	• ACPI/PCI PM 1.0 • PC99 ready • Device Class PM 1.0 • PCI 2.2 support • New CardBus Device Class PM	• Supports new PCI PM for CardBus • GHK package is pin-compatible with PCI4410
PCI4410[1] • GHK • PDV	• ACPI/PCI PM 1.0 • PC99 ready • Device Class PM 1.0 • PCI 2.2 support • New CardBus Device Class PM	• Integrated CardBus/1394 Link Controller • Supports new PCI PM for CardBus • GHK package is pin-compatible with the PCI1410

PCI-to-PCI bridges, PCI-to-DSP bridges, other support products

Device	Spec compliance	Features
PCI2030	• Supports PCI Local Bus Specification 2.1 • Supports PCI-to-PCI Bridge Specification 1.0	• Not recommended for new design-ins
PCI2031	• Supports PCI Local Bus Specification 2.1 • Supports PCI-to-PCI Bridge Specification 1.0	• Provides internal arbitration for up to six secondary masters • Provides six secondary PCI bus clock outputs • 32-bit expansion interface support • 33-MHz bridge • Packaged in 176-pin QFP
PCI2250[2]	• Supports PCI Local Bus Specification 2.1 • Supports PCI-to-PCI Bridge Specification 1.0 • Compact PCI Hot-Swap Spec. Rev. 1.0 Cmp.	• Provides internal arbitration for up to four secondary masters • 32-bit expansion interface support • 33-MHz bridge • Packaged in 160-pin QFP
HPC3130	• PCI Hot-Plug Revision 1.0 Compliance	• Supports up to four independently controlled hot-plug spots • Supports 66-MHz PCI-clock frequency • Provides register accessing through both generic and serial two-wire interface
PCI2040[1]	• PCI Local Bus Specification 2.2 Compliance • PCI Bus Power Mgmt. Interface Spec. 1.1 Cmp. • CPCI Hot-Swap PICMG 2.1 Rev. 1.0 Compliance	• Provides glueless interface to HPI port of C54x and/or C6x • Supports up to four DSP devices on HPI interface • 8/16-bit HPI • Target only

[1] Available 3Q99   [2] Available 4Q99   [3] Includes leads and balls

Recommended for mass-market/non-notebook customers.