

PCI Express Timing Solutions

Industry's broadest offering of PCIe Gen1, Gen2, Gen3 and Gen4 clock generation and buffering solutions

- Clock generators
- Zero delay buffers
- Fanout buffers and multiplexers

PCI Express Signal Retimers and Repeaters

Active signal conditioning for applications up to 8 Gbps PCIe Gen 3

- Four, eight and sixteen channels
- Compensates for cable and PCB trace attenuation and ISI jitter
- Configurable receiver equalization
- Configurable transmitter de-emphasis
- On-chip diagnostics support
- Leading edge power minimization in active and shutdown modes

PCI Express Switches

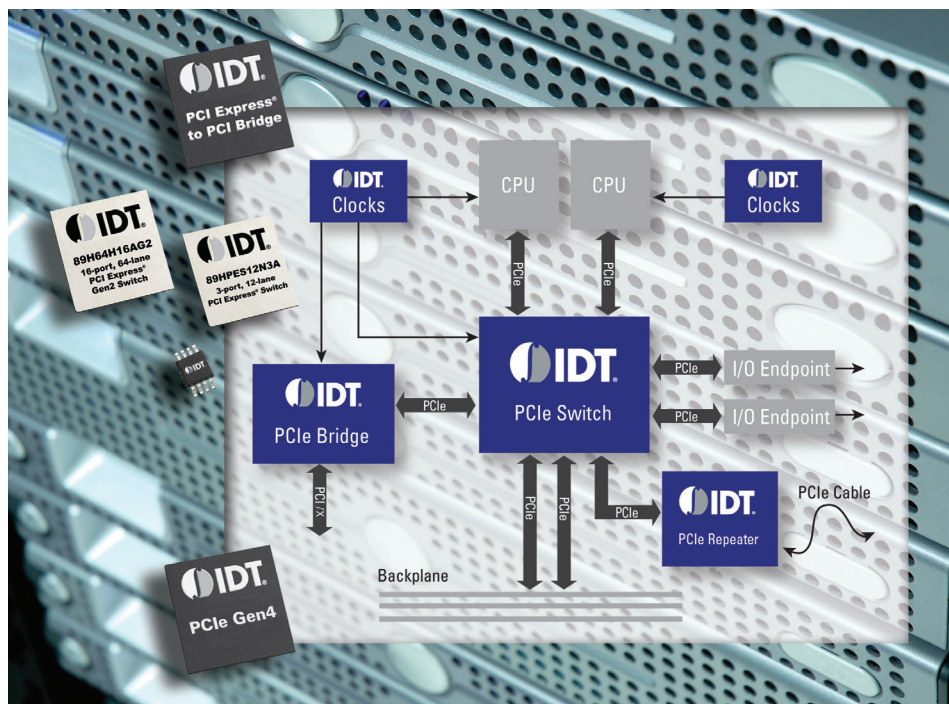
Industry's most comprehensive family of high-performance, scalable PCIe switching solutions

- Extensive portfolio
- Up to 64 lane and 24 port devices
- Highly flexible port configurations
- Unprecedented 8 non-transparent bridging (NTB) functions to enable multi-root applications

PCI Express Bridges

High performance PCIe bridging to legacy PCI and PCI-X protocols

- Ultra-low power version for consumer applications
- Forward mode buffer optimization
- The only PCI Express bridges with Short Term Caching for significant improvement in PCI Read performance
- Pin-compatible with competitive offerings for dual source solution



PCI Express® (PCIe®) is globally recognized as the general purpose I/O that unifies the component interconnect across many applications including desktop computing, servers, workstations, storage, networking, enterprise router, industrial test and control equipment, defense, aerospace and many more.

IDT provides an extensive product portfolio that tackles design requirements needed to build an entire PCI Express network, including timing solutions, switches, signal integrity and bridges.

Timing

- Clock synthesizers and spread spectrum clock generators
- PLL zero-delay buffers (ZDB)
- Non-PLL fanout buffers and multiplexers

Signal Integrity Products

- Retimers
- Repeaters

Switches

- I/O expansion switches
- System interconnect switches

Bridges

- PCIe to PCI / PCI-X Bridges
- PCI-X to PCI-X Bridges
- PCI to PCI Bridges

PCI Express timing provides the reference-clock while maintaining tight jitter specifications for all components.

PCI Express signal integrity is signal conditioning to remove signal noise and correct for trace/cable attenuation.

PCI Express switches provide the switching capacity for the entire PCI Express network.

PCI Express bridges provide connectivity between PCI Express and a different interconnect protocol.



Learn more:
www.idt.com/go/PCIe

PCI Express® Timing Solutions

9FG Clock (Frequency) Generators

- Eliminate up to 32 resistors
- Save up to 55 mm² of area[†]
- As small as 6.25 mm²
- 85 Ω and 100 Ω system support
- SSC generation

9DB Zero-delay Fanout Buffers

- Eliminate up to 76 resistors
- Save up to 130 mm² of area[†]
- As small as 16 mm²
- 85 Ω and 100 Ω system support
- SSC compatible

9DM Fanout Multiplexers

- Eliminate up to 48 resistors
- Save up to 82 mm² of area[†]
- As small as 9 mm²
- 85 Ω and 100 Ω system support
- SSC compatible

Full-Featured Low Power PCIe Timing Solutions

PCIe Clock Generators									
Part Number				Ref Output	PCIe Gen Compliance	PCIe Architecture Support*	Spread Spectrum Generation	Package Type	Package Dimensions (mm)
Prefix	Operating Voltage (V)	PCIe Outputs	Zout (W)						
9FG	V = 1.8 U = 1.5	02 04 06 08	31 = 33 41 = 100 41 = 100 51 = 85 P1 = Prog.	Yes	1, 2, 3	CC	0% -0.25% -0.5%	QFN-24 QFN-32 QFN-40 QFN-48	4 x 4 5 x 5 5 x 5 6 x 6
	L = 3.3**				1, 2, 3, 4	CC SRNS SRIS			
	V = 1.8	02	42 = 100		1, 2, 3	CC		QFN-16	3 x 3
				No					
PCIe Clock Zero-Delay/Fan-out Buffers***									
Part Number				Pin Control of PLL Mode	PCIe Gen Compliance	PCIe Architecture Support*	Spread Spectrum Compatible	Package Type	Package Dimensions (mm)
Prefix	Operating Voltage (V)	PCIe Outputs	Zout (W)						
9DB	V = 1.8 U = 1.5	02 04 06 08	31 = 33 41 = 100 41 = 100 51 = 85	Yes	1, 2, 3	CC	Yes	QFN-24 QFN-32 QFN-40 QFN-48	4 x 4 5 x 5 5 x 5 6 x 6
	L = 3.3**				1, 2, 3, 4	CC SRNS SRIS			
				No					
PCIe Clock Fan-out Buffers***									
Part Number				Pin Control of PLL Mode	PCIe Gen Compliance	PCIe Architecture Support*	Spread Spectrum Compatible	Package Type	Package Dimensions (mm)
Prefix	Operating Voltage (V)	PCIe Outputs	Zout (W)						
9DB	V = 1.8 U = 1.5	05 07 09	31 = 33 41 = 100 41 = 100	N/A	1, 2, 3, 4	CC	Yes	QFN-32 QFN-40 QFN-48	5 x 5 5 x 5 6 x 6
	L = 3.3**	07 09	41 = 100 51 = 85			CC SRNS SRIS		QFN-40 QFN-48	5 x 5 6 x 6
				No					
PCIe Clock Multiplexers									
Part Number				Sync/Async Switch Mode	PCIe Gen Compliance	PCIe Architecture Support*	Spread Spectrum Compatible	Package Type	Package Dimensions (mm)
Prefix	Operating Voltage (V)	PCIe Outputs	Zout (W)						
9DM	V = 1.8 U = 1.5	01 04	31 = 33 41 = 100	Yes	1, 2, 3	CC	Yes	QFN-16 QFN-24	3 x 3 4 x 4
	L = 3.3**	04	41 = 100 51 = 85		1, 2, 3, 4	CC SRNS SRIS		QFN-24	4 x 4
				No					

[†] Compared to traditional HCSL outputs

* CC = Common Clock, SRNS = Separate Reference No Spread, SRIS = Separate Reference Independent Spread

** L devices are factory customizable

*** For applications requiring more than 9 outputs, see IDT's 9ZXL line of PCIe Buffers

PCI Express Signal Integrity Products

PCIe Gen3 and Gen2 Standards

With the increase of signal speeds in the computing, storage and communications applications, system designers increasingly face signal integrity challenges. Signal Integrity Product (SIP) components provide signal conditioning for applications up to 8 Gbps, PCI Express® 3.0, delivering signal quality over extended distances while offering simplified design by alleviating board layout constraints.

These devices incorporate advanced receive equalization and transmit de-emphasis capabilities, as well as diagnostic features that help IDT customers achieve a simplified design with faster time-to-market. Specifically, the devices drive long on-board traces, backplane traces and cables to external devices to ensure optimum system performance. The devices all offer power savings modes for the lowest-possible power consumption.

FEATURES

- Extends trace over 60 inches, and cable over 10 meters
- Eliminates Deterministic Jitter (Dj), Random Jitter (Rj) and Inter-Symbol Interference (ISI)
- Optimizes system performance by reducing lost packets
- Better system reliability with increased signal voltage and timing margins
- Simplifies system design and time-to-market

Part Number	Channels	Pin Config	I ² C Config	Package (mm)	Contact Pitch (mm)
PCIe 3.0 Retimers					
89HT0808P	8	N	Y	9 x 9 BGA	0.8
89HT0816P	16	N	Y	15 x 15 BGA	1.0
89HT0816AP	16	N	Y	15 x 15 BGA	1.0
89HT0832P	32	N	Y	13 x 20 BGA	0.8
89HT0832P	32	N	Y	16 x 24 BGA	1.0
PCIe 2.1 Repeaters					
89HP0504P	4	N	Y	4 x 7.5 QFN	0.5
89HP0504P	4	Y	Y	9 x 9 BGA	1.0
89HP0504PB	4	Y	N	4 x 7.5 QFN	0.5
89HP0508P	8	N	Y	9 x 9 BGA	1.0

Additional products and information available — www.idt.com/go/PCleSIP

PCI Express Switches

Featuring Dual DMA, Multiple NTB, Multicast; Configurations 3 to 64 Lanes and 3 to 24 Ports

IDT provides the industry's most comprehensive family of high performance, scalable PCI Express switching solutions. PCIe® switching solutions are optimized by application to maximize performance per watt for the most demanding applications.

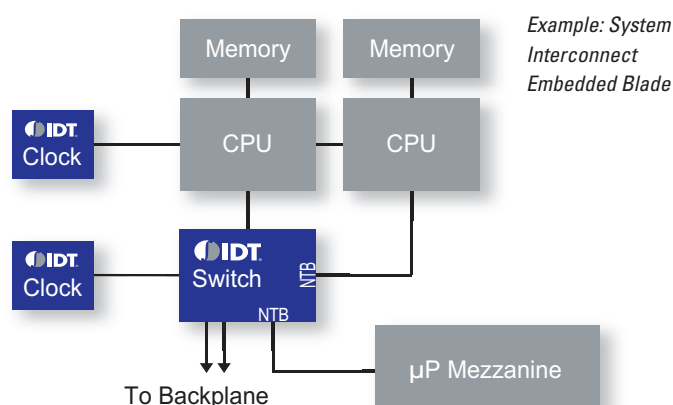
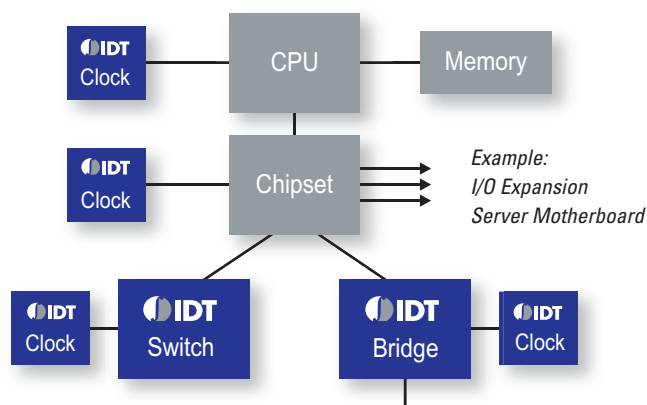
IDT "I/O Expansion PCIe Switches" are commonly used to connect a single Root Complex to I/O devices and add-in cards. In this usage

model, the majority of traffic flows between the Root Complex and the I/O devices.

The other primary usage model is using a PCIe switch as an embedded system fabric referred to as "System Interconnect Switch," which utilizes a high degree of peer-to-peer traffic. The System Interconnect Switch is capable of PCIe domain isolation, which may involve connecting multiple processing endpoints or simply providing a redundant backplane architecture.

FEATURES

- Most advanced switching architecture available
 - Switch partitioning
 - Adaptive cut-through latency
 - Request metering
 - Large flow control credits and buffers
- Enables multi-domain communication in multi-root applications
 - Multiple non-transparent bridge functions
 - Multi-port timing domain and spread spectrum clock support
 - Multicast
 - Dual DMA controllers



PCI Express® Switches

Part Number	PCIe Specification	Lanes	Ports	Switch Partitions (Multi-root)	NTB Ports	DMA Controllers	Multicast	Multi-Domain Clocking	Package Size (mm)
89H32NT24AG2	2	32	24	8	8	2	Yes	8	23 x 23
89H32NT8AG2	2	32	8	8	8	2		8	23 x 23
89H24NT6AG2	2	24	6	6	6	2		6	23 x 23
89H24NT24G2	2	24	24	8	8	2		2	23 x 23
89H16NT16G2	2	16	16	4	4	2		2	19 x 19
89H12NT12G2	2	12	12	3	3	2		2	19 x 19
89HPES64H16G2	2	64	16	16	N/A	N/A	N/A	N/A	35 x 35
89HPES48H12G2	2	48	12	12					27 x 27
89HPES32T8G2	2	32	8	N/A					23 x 23
89HPES24T6G2	2	24	6						19 x 19
89HPES24T3G2	2	24	3						19 x 19
89HPES16T4G2	2	16	4						23 x 23
89HPES12T3G2	2	12	3						19 x 19
89HPES6T6G2	2	6	6						19 x 19
89HPES8T5A	1	8	5						15 x 15
89HPES5T5	1	5	5						15 x 15
89HPES4T4	1	4	4	15 x 15					
89HPES3T3	1	3	3	10 x 10					

Additional products and information available — www.idt.com/go/PCleSwitches

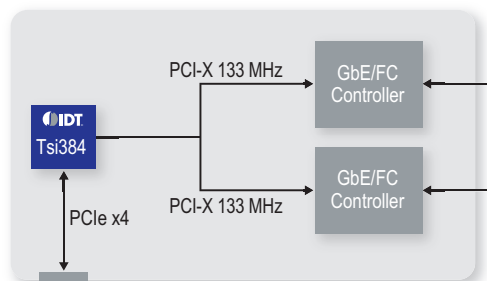
PCI Express Bridges

PCIe to PCI and PCI-X Bus Standards

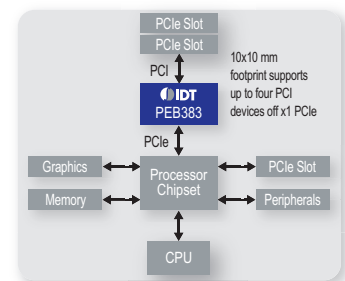
To complement the switch products, IDT offers bridges to connect PCIe to the PCI and PCI-X bus standards. A PCIe bridge is used for bridging devices that use the PCI/X interface to provide a PCIe connection to a host processor or root complex. Applications include PCIe adapter cards, embedded computing, and motherboards to provide connection to PCI/X devices or additional PCI/X expansion slots.

FEATURES

- Compliant to PCIe 1.1 specification
- Low latency & high throughput features
- Proven interoperability
- Small footprint packages
- Simple power supply requirements
- Comprehensive design tools



Example: Storage HBA



Example: Motherboard Application

Bridge	Part Number	PCIe I/F	PCI Speed (MHz)	External Master Support	Power	Package (mm)
PCIe to PCI	89HPEB383	x1 Gen1	32/66	4	450 mW	14 x 14 QFP 10 x 10 QFN
PCIe to PCI	Tsi381	x1 Gen1	32/66	4	700 mW	13 x 13 PBGA
PCIe to PCI	Tsi382	x1 Gen1	32/66	4	700 mW	20 x 20 QFP 10 x 10 PBGA
PCIe to PCI-X	Tsi384	x4 Gen1	64/133	4	1.3 W	17 x 17 PBGA
PCI to PCI	Tsi340	N/A	32/66	4	500 mW	23 x 17 QFP
PCI to PCI	Tsi350		32/66	9	1.0 W	31 x 31 QFP 17 x 17 BGA
PCI to PCI	Tsi352		32/66	4	500 mW	32 x 32 QFP

Contact an IDT representative for details on pin-compatibility with comparable solutions.

Additional products and information available — www.idt.com/go/PCleBridges