



Integrated Device Technology

PCI Express Solutions

Comprehensive Portfolio from the Leader in PCI Express Solutions

CLOCKS AND TIMING

INTERFACE AND CONNECTIVITY

MEMORY AND LOGIC

POWER MANAGEMENT

RF PRODUCTS

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

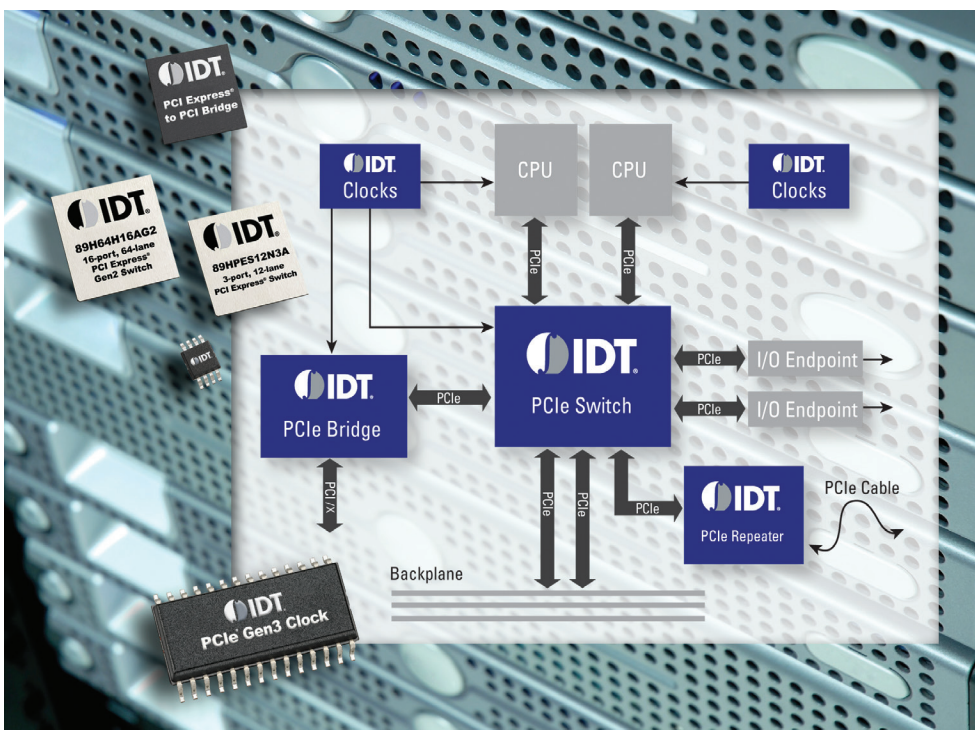
High performance PCIe bridging to legacy PCI and PCI-X protocols

- 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 Timing Solutions

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

- World's first PCI Express Gen3 family of timing devices
- Clock generators
- Fanout buffers and multiplexers
- Zero delay buffers



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 switches, bridges, signal integrity and timing solutions.

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

Timing

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

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.

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



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

PCI Express Signal Integrity Products

PCIe Gen 3 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.

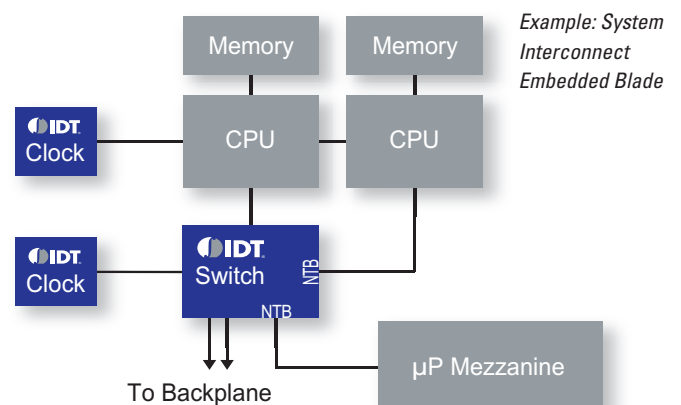
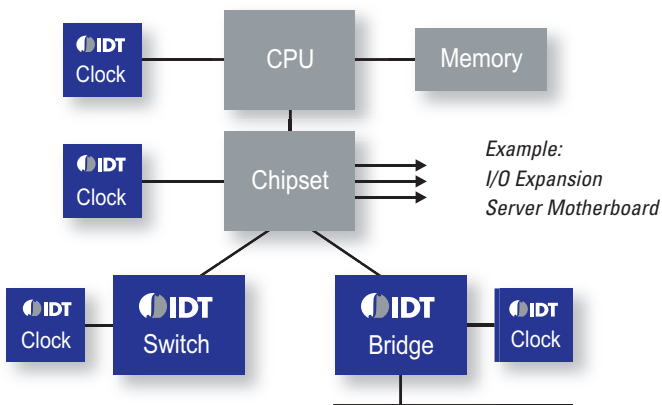
IDT "I/O Expansion PCIe Switches" are commonly used to connect a single Root Complex to I/O devices and add-in cards. In this usage

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

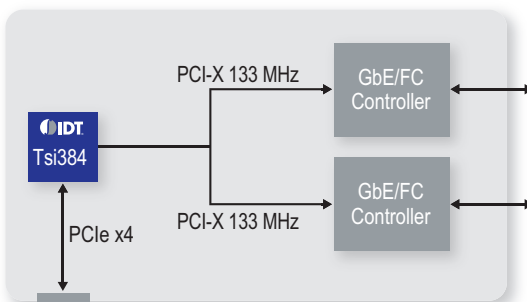
Part Number	PCIe Specification	Lanes	Ports	Switch Partitions (Multi-root)	NTB Ports	DMA Controllers	Multicast	Multi-Domain Clocking	Package Size (mm)
89H32NT24AG2	2	32	24	8	8	2	Yes	8	23 x 23
89H32NT8AG2	2	32	8	8	8	2		8	23 x 23
89H24NT6AG2	2	24	6	6	6	2		6	23 x 23
89H24NT24G2	2	24	24	8	8	2		2	23 x 23
89H16NT16G2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

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

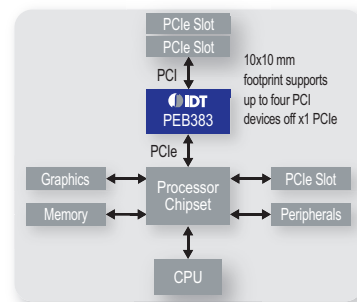
PCI Express Bridges

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.



Example: Storage HBA



Example: Motherboard Application

FEATURES

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

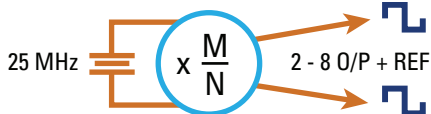
Bridge	Part Number	PCIe I/F	PCI Speed (MHz)	External Master Support	Power	Package (mm)
PCIe to PCI	89HPEB383	x1 Gen1	32/66	4	450 mW	14 x 14 QFP 10 x 10 QFN
PCIe to PCI	Tsi381	x1 Gen1	32/66	4	700 mW	13 x 13 PBGA
PCIe to PCI	Tsi382	x1 Gen1	32/66	4	700 mW	20 x 20 QFP 10 x 10 PBGA
PCIe to PCI-X	Tsi384	x4 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/PCIEBridges

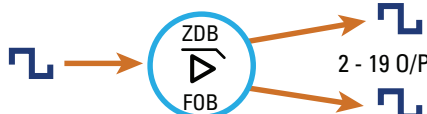
PCI Express® Timing Solutions

9FG Clock (Frequency) Generators



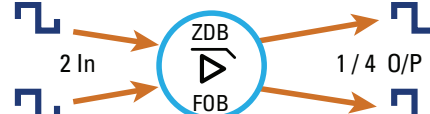
- Eliminate up to 32 resistors
- Save up to 55 mm² of area*
- As small as 6.25 mm²
- 85 Ω and 100 Ω system support
- SSC generation

9DB and 9ZX Zero-delay and 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 and 9ZM Zero-delay and 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

PCIe Gen123 Clock Generators

Part Number	Operating Voltage	Zout (Ω)	PCIe Outputs	Ref Output	Spread Spectrum Generation	Resistors Saved	Area Saved* (mm ²)	Package Area (mm ²)	Package Type	Typ. Idd (mA)	Typ. Gen 3 Jitter w/SSC (ps rms)
9FGU0241/9FGV0241/9FGL0241/51/P1	9FGU = 1.5 V 9FGV = 1.8 V 9FGL = 3.3 V	xx41 = 100 xx51 = 85 xxP1 = Prog	2	Yes	Yes	8	14	16	VFQFPN-24	28	0.3 - 0.4
9FGV0242			2	No		8	14	6.25	VFQFPN-16	17	
9FGU0441/9FGV0441/9FGL0441/51/P1			4	Yes		16	27	25	VFQFPN-32	32	
9FGU0641/9FGV0641/9FGL0641/51/P1			6	Yes		24	41	25	VFQFPN-40	39	
9FGU0841/9FGV0841/9FGL0841/51/P1			8	Yes		32	55	36	VFQFPN-48	46	

PCIe Gen123 Clock Buffers

Part Number	Operating Voltage	Zout (Ω)	PCIe Outputs	PLL/ZDB Mode	Spread Spectrum Compatible	Resistors Saved	Area Saved* (mm ²)	Package Area (mm ²)	Package Type	Typ. Idd (mA)	Typ. Gen 3 Jitter w/SSC (ps rms)
9DBU0241/9DBV0241	9DBU = 1.5 V 9DBV = 1.8 V	xx41 = 100 xx51 = 85 xxP1 = Prog	2	Yes	Yes	8	14	16	VFQFPN-24	16	0.5
9DBU0441/9DBV0441			4	Yes		16	27	25	VFQFPN-32	31	0.5
9DBL411			4	No		8	14	16	VFQFPN-20	40	<0.2 additive
9DBU0541/9DBV0541			5	No		20	34	25	VFQFPN-32	25	<0.1 additive
9DBU0641/9DBV0641			6	Yes		24	41	25	VFQFPN-40	41	0.5
9DBU0741/9DBV0741			7	No		28	48	25	VFQFPN-40	34	<0.1 additive
9DBU0841/9DBV0841			8	Yes		32	55	36	VFQFPN-48	46	0.5
9DBU0941/9DBV0941			9	No		36	62	36	VFQFPN-48	44	<0.1 additive

PCIe Gen1/2/3 + QPI Clock Buffers

Part Number	Operating Voltage	Zout (Ω)	PCIe Outputs	PLL/ZDB Mode	Spread Spectrum Compatible	Resistors Saved	Area Saved* (mm ²)	Package Area (mm ²)	Package Type	Typ. Idd (mA)	Typ. Gen 3 Jitter w/SSC (ps rms)
9ZXL0651	9ZXL = 3.3 V	xx30/31=33 xx50/51=85	6	Yes	Yes	24	41	25	VFQFPN-40	62	0.6
9ZXL0831/51			8			32	55	36	VFQFPN-48	78	0.5
9ZXL1231/1251			12			48	82	16	VFQFPN-64	135	0.5
9ZXL1530/50			15			60	103	25	VFQFPN-64	162	0.5
9ZXL1930/50			19			76	130	25	VFQFPN-72	186	0.5

PCIe Gen1/2/3 Clock Multiplexers (2 Inputs)

Part Number	Operating Voltage	Zout (Ω)	PCIe Outputs	Sync/Async Mode	Spread Spectrum Compatible	Resistors Saved	Area Saved* (mm ²)	Package Area (mm ²)	Package Type	Typ. Idd (mA)	Typ. Gen 3 Jitter w/SSC (ps rms)
9DMU0141/9DMV0141	9DMU = 1.5 V 9DMV = 1.8 V	xx41 = 100 xx51 = 85 xxP1=Prog	1	Yes	Yes	4	7	9	VFQFPN-16	8	<0.1 additive
9DMU0441/9DMV0441			4			16	27	16	VFQFPN-24	20	<0.1 additive

* Compared to traditional HCSL outputs.