PE310G4BPI9 Bypass Card

Quad Port Fiber 10 Gigabit Ethernet Bypass Server Adapter Intel® 82599ES Based

Product Description

Silicom's quad port fiber 10Gigabit Ethernet Bypass server adapter is a PCI-Express X8 network interface card that contains four 10 Gigabit Ethernet ports on a PCI-E adapter.

The Silicom's quad port fiber 10 Gigabit Ethernet Bypass server adapter is targeted to inline network system that maintains network connectivity when system fails.

Silicom's quad port fiber 10 Gigabit Ethernet Bypass server adapter supports Normal, Bypass and Disconnect modes. In Normal mode, the ports are independent interfaces. In Bypass mode, all packets received from one port are transmitted to the adjacent port. In Disconnect mode, the adapter simulates switch / rout cable disconnection.

Silicom's quad port fiber 10 Gigabit Ethernet Bypass server adapter can Bypass or disconnect its Ethernet ports on a host system failure, power off, or upon software request.

In Bypass mode, the connections of the Ethernet ports are disconnected from the system and switched over to the other port to create a crossed connection loop-back between the Ethernet ports. Hence, in bypass mode all packets received from one port are transmitted to the adjacent port and vice versa.

This feature enables to bypass a failed system and provides maximum up time for the network.

Silicom's quad port fiber 10 Gigabit Ethernet Bypass server adapter includes an on board WDT (Watch Dog Timer) controller. The adapter's software drivers or software application can write commands to the on board WDT controller.

The adapter's software drivers, WDT controller and the Bypass circuitry provide an interface that control and manage the mode of the adapter. The Silicom 10 Gigabit Ethernet Bypass server adapters are based on Intel 82599ES Ethernet controllers.

Key Features

Bypass / Disconnect:

- Bypass / Disconnect Ethernet ports on Power Fail, System Hangs or Software Application Hangs

- Software programmable Bypass, Disconnect or Normal Mode

- On Board Watch Dog Timer (WDT) Controller

- Software programmable time out interval

- Software Programmable WDT Enable / Disable counter

- Software programmable Bypass Capability Enable / Disable

- Software Programmable Disconnect Capability Enable / Disable

- Software Programmable mode (Bypass, Normal or Disconnect mode) at Power up

- Software Programmable mode (Bypass, Normal mode) at Power off

- Independent Bypass operation in every two ports

- Emulates standard NIC

Fiber 10 Gigabit Ethernet 10GBASE-SR:

- 10 Gigabit Fiber Ethernet port supports 10GBASE-SR (850nM LAN PHY)

- 10Gigabit 850nM Small form Factor Pluggable (SFP+)

Fiber 10 Gigabit Ethernet 10GBASE-LR:

- 10 Gigabit Fiber Ethernet port supports 10GBASE-LR (1310nM LAN PHY)

- 10Gigabit 1310nM Small form Factor Pluggable (SFP+)

-SRD: Fiber 1/10 Gigabit Ethernet 1000Base-SX / 10GBASE-SR:

- 10 Gigabit Fiber Ethernet port supports 10GBASE-SR (850nM LAN PHY)

- 1Gigabit Fiber Ethernet port supports 1000BASE-SX (850nM LAN PHY)

- 1/10Gigabit 850nM Small form Factor Pluggable (SFP+) •

-LRD: Fiber 1/10 Gigabit Ethernet 1000Base-LX / 10GBASE-LR:

- 10 Gigabit Fiber Ethernet port supports 10GBASE-LR (1310nM LAN PHY)

- 1Gigabit Fiber Ethernet port supports 1000BASE-LX (1310nM LAN PHY)

- 1/10Gigabit 1310nM Small form Factor Pluggable (SFP+)

Fiber 10 Gigabit Ethernet 10GBASE-SR5 (SR 50uM):

- 10 Gigabit Fiber Ethernet port supports 10GBASE-SR (850nM LAN PHY)

- 10Gigabit 850nM Small form Factor Pluggable (SFP+)

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Performance Features:

- IPV4 and IPV6 Supports for IP/ TCP and IP/UDP Receive Checksum offload

- Fragmented UDP checksum offload for Packet Reassembly

- CPU utilization- the 82599 supports reduction in CPU utilization, mainly by supporting Receive Side Coalescing (RSC)

- Support for 16 virtual machine Device Queues (VMDq) per port

- Support Direct Cache Access (DCA)

- Advanced memory architecture reduces latency by preceding TSO packets. A TSO packet may be interleaved with other packets going to the wire

- Minimized number of device I/O interrupts using MSI and MSI-X

- Offload of TCP / IP / UDP checksum calculation and TCP segmentation

- Large on chip receive packet buffer (512 KB)

- Large on chip transmit packet buffer (160KB)

- Jumbo Frame (up to 16KB)

Host Interface:

- PCI Express X8 lanes

- Support PCI Express Base Specification 3.0 (8GT/s)

Technical Specifications

Bypass Specifications	
WDT Interval (Software Programmable):	3,276,800 mSec (3,276.8 Sec): Maximum 100 mSec (0.1 Sec) : Minimum WDT Interval = (2^wdt_interval_parameter)*(0.1) sec. wdt_interval_parameter: { Valid Range: 0-15}
Fiber 10 Gigabit Ethernet Technical Specifications – (10GBASE-SR) Adapters:	
IEEE Standard / Network topology:	Fiber Gigabit Ethernet, 1000Base-SX (850nM)
Data Transfer Rate:	10.3125GBd
Cables and Operating distance: **Up to:**	Multimode fiber: 62.5um, 160MHz/Km 13m* 62.5um, (OM1)200MHz/Km 16.5m * * Defined as half as the distance as specified in the optical transceiver

Optical Output Power:	Normal Mode (Bypass Off): Typical: -2.61 dBm (TX –Switch Normal – Fiber – LC/LC) Minimum: -7.3 dBm
Optical Receive Sensitivity:	Normal Mode (Bypass Off) Typical: -15 dBm Maximum: -11.1 dBm
Insertion Loss:	Bypass Mode: Insertion loss (Optical Power attenuation between TX to RX) (LC- fiber- switch- LC) Typical: 0.99 dB (From RX to TX) Maximum 1.9 dB
Fiber 10 Gigabit Ethernet Technical Specifications – (10GBASE-LR) Adapters:	
IEEE Standard / Network topology:	Fiber 10Gigabit Ethernet, 10GBASE-LR (1310nM LAN PHY)
Data Transfer Rate:	10.3125GBd
Cables and Operating distance: Up to:	Single-Mode: 5Km at 9um * * Defined as half as the distance as specified in the optical transceiver
Optical Output Power:	Normal Mode (Bypass Off): Typical: -5.02 dBm (TX –Switch Normal – Fiber – LC/LC) Minimum: -7.3 dBm
Optical Receive Sensitivity:	Normal Mode (Bypass Off) Typical: -13.9 dBm Maximum: -11.1 dBm
Insertion Loss:	Bypass Mode: Insertion loss (Optical Power attenuation between TX to RX) (LC- fiber- switch- LC) Typical: 0.69 dB (From RX to TX) Maximum 1.6 dB
– SRD: Fiber 1000BASE-SX / 10GBASE-SR Technical Specifications:	
Optical Output Power (1G):	Minimum: -10.9 dBm
Optical Receive Sensitivity (1G):	Maximum: -15.6 dBm

Insertion Loss (1G)	Maximum: +1.9 dBm
Output Transmit Power (10G):	Minimum: -7.3 dBm
Optical Receive Sensitivity (10G):	Maximum: -11 dBm
Insertion Loss (10G):	Maximum: 1.6 dBm

– LRD: Fiber 1000BASE-LX / 10GBASE-LR Technical Specifications:	
Optical Output Power (1G):	Minimum: -10.8 dBm m
Optical Receive Sensitivity (1G):	Maximum: -19 dBm
Insertion Loss (1G):	Maximum: +0.5dBm
Output Transmit Power (10G):	Minimum: -5.2dBm
Optical Receive Sensitivity (10G):	Maximum: –12.6 dBm
Insertion Loss (10G):	Maximum: +0.5 dBm

Fiber Gigabit Ethernet Technical Specifications – (10GBASE-SR5) (50uM) Adapters:	
IEEE Standard / Network topology:	Fiber Gigabit Ethernet, 1000Base-SR (850nM)
Data Transfer Rate:	10.3125GBd
Cables and Operating distance: **Up to:**	Multimode fiber: 50um, 400MHz/Km 33m * 50um, (OM2)500 MHz/Km 41m * 50um, (OM3)2000MHz/Km 150m* *Defined as half as the distance as specified in the optical transceiver
Optical Output Power:	Normal Mode (Bypass Off): Typical: -2.95 dBm (TX Switch Normal – Fiber – LC/LC) Minimum: -3 dBm
Optical Receive Sensitivity:	Normal Mode (Bypass Off) Typical: -14.79 dBm

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	Maximum: -11.1dBm
Insertion Loss:	Bypass Mode: Insertion loss (Optical Power attenuation between TX to RX) (LC- fiber- switch- LC) Maximum 1.9 dB Typical: 1.3 dB (From RX to TX)

Operating Systems Support	
Operating system support:	Windows Linux FreeBSD VMware Hyper-V

General Technical Specifications	
Interface Standard:	PCI-Express Base Specification Revision 3.0 (8 GTs)
Board Size:	Standard height long add-in card 241.3mm X 110.13mm (9.5"X 4.336")
PCI Express Card Type:	X8 Lane
PCI Express Voltage:	+12V +- 8%
PCI Connector:	Gold Finger: X8 Lane
Controller:	Intel 82599ES
Holder:	Metal Bracket
I/O:	LC located on internal bracket
Weight:	460 gram (16.227 oz)
Power Consumption (SR):	17.64 W, 1.47 A at 12V: Typical all ports operate at 10Gb/s, (Normal Mode). 16.8 W, 1.4 A at 12V: Typical Bypass Mode. 16.92 W, 1.41 A at 12V: Typical Disconnect Mode. 17.28 W, 1.44 A at 12V: Typical No link at all ports
Power Consumption (SR5):	18.24 W, 1.52 A at 12V: Typical all ports operate at 10Gb/s, (Normal Mode). 17.4 W, 1.45 A at 12V: Typical Bypass Mode. 17.52 W, 1.46 A at 12V: Typical Disconnect Mode.

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	18 W, 1.5 A at 12V: Typical No link at all ports
Power Consumption (LR):	18.84 W, 1.57 A at 12V: Typical all ports operate at 10Gb/s, (Normal Mode).
	16.56 W, 1.38 A at 12V: Typical Bypass Mode.
	16.92W, 1.41 A at 12V: Typical Disconnect Mode.
	18.24 W1.52 A at 12V: Typical No link at all ports
Operating Humidity:	0%–90%, non-condensing
Operating Temperature:	0°C – 45°C (32°F – 113°F)
Storage:	-40°C–65°C (-40°F–149°F)
EMC Certifications:	FCC Part 15, Subpart B Class A
	Conducted Emissions
	Radiated Emissions
	CE EN 55022: 1998 Class A Amendments A1: 2000; A2: 2003
	Conducted Emissions
	Radiated Emissions
	CE EN 55024: 1998 Amendments A1: 2000; A2: 2003
	Immunity for ITE Amendment A1: 2001
	CE EN 61000-3-2 2000, Class A
	Harmonic Current Emissions
	CE EN 61000 3-3 1995, Amendment A1: 2001
	Voltage Fluctuations and Flicker
	CE IEC 6100-4-2: 1995
	ESD Air Discharge 8kV. Contact Discharge 4kV.
	CE IEC 6100-4-3:1995
	Radiated Immunity (80-1000Mhz), 3V/m 80% A.M. by 1kHz
	CE IEC 6100-4-4:1995
	EFT/B: Immunity to electrical fast transients 1kV Power
	Leads, 0.5Kv Signals Leads
	CE IEC 6100-4-5:1995
	Immunity to conductive surges COM Mode; 2kV,
	Dif. Mode 1kV
	CE IEC 6100-4-6:1996
	Conducted immunity (0.15-80 MHz) 3VRMS 80% A.M.
	By 1kHz
	CE IEC 6100-4-11:1994
	Voltage Dips and Short Interruptions
	V reduc >95%, 30% >95% Duration 0.5per, 25per, 250per
MTBF*:	33 (Years)
	** According to Telcordia SR-332 Issue 2. Environmental condition – GB (Ground, Fixed, and

	Controlled). Ambient temperature 40°C
LEDs	
LEDs:	(2) LEDs per port Left LED: Link: Turns on link 10G (Blue), Right LED : Act: Blinks on activity (Green) : (1) Bi- color LED per segment (2 ports): Off on Normal Mode Turns on Bypass Mode (Green) / Turns on Disconnect Mode (Yellow)
LEDs location:	LEDs are located on the PCB, visible via holes in the metal bracket. Each 4 green act and blue 10G link LEDs (2 LEDs per port) are located under their own LC connector port. (Each LC contains 2 ports). The yellow/ green for disconnect and bypass LED is located between the 2 ports in each segment- in the middle under each LC.
Connectors:	(2) LC

Functional Description

Silicom's Bypass Server adapters support Normal, Bypass and Disconnect modes.

In Normal mode, the ports are independent interfaces (see Figure 1: Normal mode, one Bypass pair is illustrated).

Figure 1: Normal Mode Functional Block Diagram
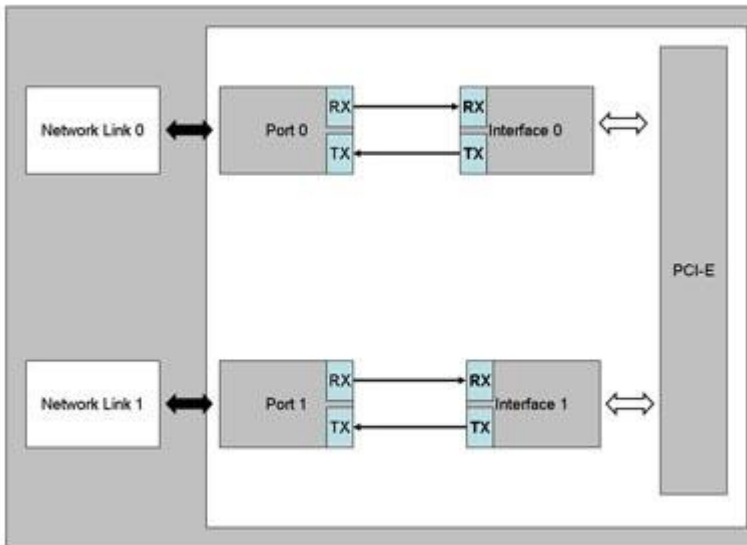
In Bypass mode, the connections of the Ethernet network ports are Disconnected from the interfaces and switched over to the other port to create a crossed connection loop-back between the Ethernet ports. The connections of the interfaces are left not connected. (See Figure 2: one Bypass pair illustrated)

Figure 2: Bypass Mode Functional Block Diagram
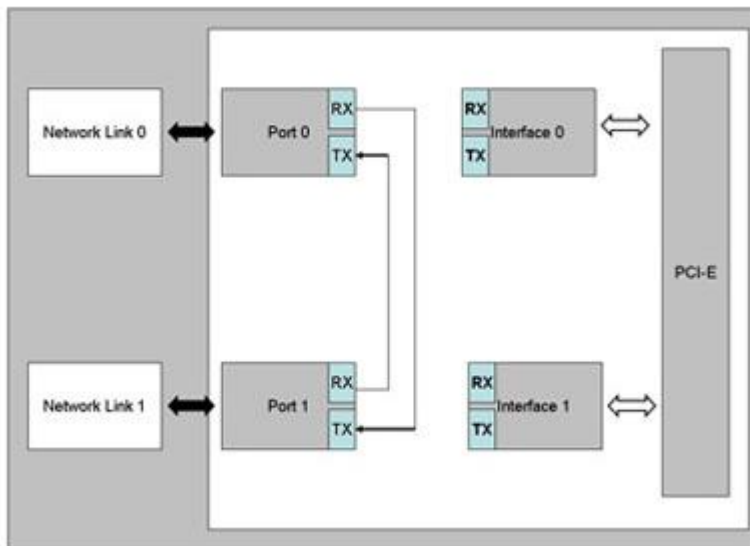
In Disconnect mode, the transmit connections of the Ethernet network ports are Disconnected from the interfaces. (See Figure 3: one Bypass pair illustrated)

Figure 3: Disconnect Mode Functional Block Diagram
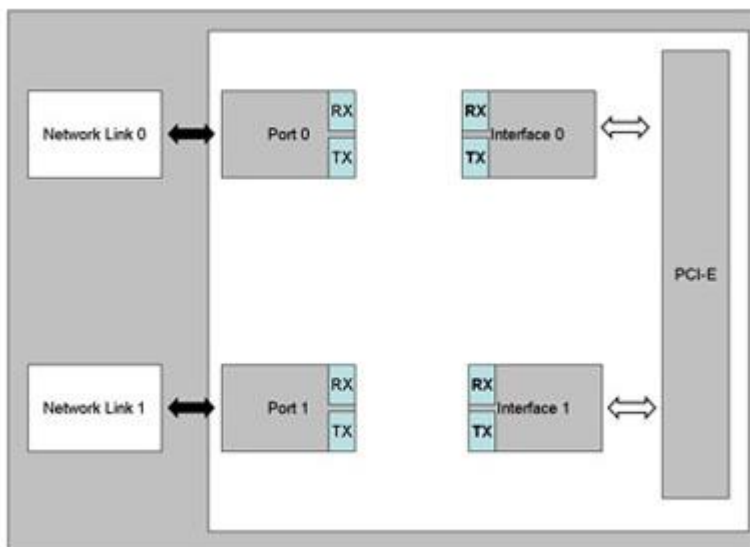
Silicom Bypass server adapters include an on board Controller that can Bypass the Ethernet ports on host system failure like Power Off, System hangs or software application hangs. The software programmable Watch Dog Timer (WDT) Controller detects a host system fails and it will Bypass automatically the Ethernet ports after programmable time out interval. The WDT Controller can be software programmable enabled or disabled.

Silicom Bypass server adapters support software programmable to select Bypass or Normal mode. In Normal mode, the ports of the adapters remain independently operational.

The drivers of the adapters and the Bypass circuitry provides an interface that control and management the mode of the adapter. The adapter software driver or software application can writes commands to the on board controller. The on board controller processes the commands and activates the bypass circuitry accordingly.

After power up the default mode of the adapter is to be in Bypass mode. After driver is loaded, the adapter software driver or application can set the card to a Normal mode. After the Host system issues reset, setting of Bypass controller and circuitry are reserved.

Silicom Bypass server adapters support Disable Bypass Capability; hence, if those adapters receive Disable Bypass Capability command, the adapter does not Bypass its Ethernet ports, in this state the four Ethernet ports are independent. The Disable Bypass Capability state is reserved also after power off. This feature enables to emulate a standard NIC.

Silicom Bypass server adapters can be set to Bypass or Normal mode at power up. This setting programmable and is reserved also after power off.

Order Information

P/N	Description	Notes
PE310G4BPI9-SR-SD	Quad Port Fiber (SR) 10 Gigabit Ethernet Bypass Server Adapter	X8, Based on Intel 82599ES, PCI-E adapter, on board support for Fiber SR, RoHS compliant
PE310G4BPI9-LR-SD	Quad Port Fiber (LR) 10 Gigabit Ethernet Bypass Server Adapter	X8, Based on Intel 82599ES, PCI-E adapter, on board support for Fiber LR, RoHS compliant
PE310G4BPI9-SRD-SD	Quad Port Fiber (SX/SR) 10 Gigabit Ethernet PCI Express Bypass Server Adapter	X8 Gen 3, Based on Intel 82599ES, on board support for Fiber SX/SR, RoHS compliant
PE310G4BPI9-LRD-SD	Quad Port Fiber (LX/LR) 10 Gigabit Ethernet PCI Express Bypass Server Adapter	X8 Gen 3, Based on Intel 82599ES, on board support for Fiber LX/LR, RoHS compliant
PE310G4BPI9-SR5-SD	Quad Port Fiber (SR- 50 uM) 10 Gigabit Ethernet Bypass Server Adapter	X8, Based on Intel 82599ES, PCI-E adapter, on board support for Fiber SR (50 uM), RoHS compliant

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