M1E210G2BPi9

Dual Port Fiber 10 Gigabit Ethernet ExpressModule Bypass Server Adapter

Product Description

Silicom's dual port fiber 10Gigabit Ethernet ExpressModule Bypass server adapter is a PCI-Express X8 network interface card that contains two fiber (SR)10 Gigabit Ethernet ports on a PCI-E adapter. The Silicom's dual port copper 10 Gigabit Ethernet Bypass server adapter is targeted to inline network system that maintains network connectivity when system fails.

Silicom's 10 Gigabit Ethernet ExpressModule Bypass server adapters are designed for Servers and high-end appliances. The adapters offer simple integration into any PCI Express X8 to 10Gigabit Networks. The performance is optimized so that system I/O is not the bottleneck in high-performance networking applications.

Silicom's dual port fiber 10 Gigabit Ethernet ExpressModule 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 dual port fiber 10 Gigabit Ethernet ExpressModule 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 dual port fiber 10 Gigabit Ethernet ExpressModule 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 ExpressModule Bypass server adapters are based on Intel 82599EB Ethernet controller with two fully integrated Gigabit Ethernet Media Access Control (MAC) and SFI ports. In addition to managing MAC and PHY Ethernet layer functions, the controller manages PCI Express packet traffic across its transaction, link, and physical/logical layers. Using hardware acceleration, the controller offloads tasks from the host, such as TCP/UDP/IP checksum calculations and TCP segmentation.

Silicom's 10 Gigabit Ethernet ExpressModule Bypass Server adapters are the ideal solution for implementing multiple network segments, mission-critical high-powered networking applications and environments within high performance servers.

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

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 device I/O intterupts 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)
- Supports the VPD (Vital Product Data) capability defined in the PCI specification ver. 3.0.
- Time sync- IEEE1588- Precision Time Protocol (PTP)
- Supports the BCN (Backward Congestion Notification) protocol in addition to the EEDC functionality

Common Key Features:

- PCI Express ExpressModule Electromechanical Specification Revision 1.0
- Support PCI Express Base Specification 2.0 (5 GTs)
- IEEE 802.x flow control support
- IEEE 802.q VLAN tagging support
- Supports a mode where all received and sent packets have at least one VLAN tag in addition to the regular tagging
- IEEE 802.1p layer 2 priority encoding
- Jumbo Frame (up to 16KB)
- Link Aggregation and Load Balancing
- RFC2819 RMON MIB statistics
- TCP Segmentation Offload Up to 256KB
- Ipv6 Support for IP/TCP Receive Checksum Offload
- DDP Offload
- LEDs indicators for link/Activity/Bypass/ Disconnect Mode status
- Hot Plug not supported. Can be supported by assembly change
- Low power
- LC connector

Security Features:

- IEEE P802.1AE LinkSec specification. It incorporates an inline packet crypto unit to support both privacy and integrity checks on a packet by packet basis. The transmit data path includes both encryption and signing engines. On the receive data path it includes both decryption and integrity checkers
- IPsec off load for a given number of flows
- Off-load IPsec for up to 1024 Security associations (SA) for each of TX and RX
- AH and ESP protocols for authentication and encryption
- AES-128-GMAC and AES-GCM crypto engines
- Transport mode encapsulation

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 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 26m 62.5um, (OM1)200MHz/Km 33m 50um, 400MHz/Km 66m 50um, (OM2)500 MHz/Km 82m 50um, (OM3)2000MHz/Km 300m
Optical Output Power:	Normal Mode (Bypass Off): Typical: -2.74 dBm (TX –Switch Normal – Fiber – LC/LC) Minimum: -7.3 dBm
Optical Receive Sensitivity:	Normal Mode (Bypass Off) Typical: -15.33 dBm Maximum: -11 dBm
Insertion Loss	Bypass Mode: Insertion loss (Optical Power attenuation between TX to RX) (LC- fiber- switch- LC) Typical: 0.29 dB (From RX to TX) Maximum 1.6 dB
Fiber 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:	Single-Mode: 10000m at 9um
Optical Output Power:	Normal Mode (Bypass Off): Typical: -3.15 dBm (TX –Switch Normal – Fiber – LC/LC) Minimum: -8.2 dBm
Optical Receive Sensitivity:	Normal Mode (Bypass Off) Typical: -18.88 dBm Maximum: -14.4 dBm

Insertion Loss	Bypass Mode: Insertion loss (Optical Power attenuation between TX to RX) (LC- fiber- switch- LC) Typical: 0.95 dB (From RX to TX) Maximum 1.6 dB
Operating Systems Support	
Operating system support:	Windows Linux FreeBSD VMware
General Technical Specifications	
Interface Standard:	PCI ExpressModule Specification revision 1.0 PCI-Express Base Specification Revision 2.0 (5 GTs)
Board Size:	168.2mm x 98mm (6.62”X3.858”)
PCI Express Card Type:	X8 Lane
PCI Express Voltage:	+12V ± 15%
PCI Connector:	Gold Finger: X8 Lane
Controller:	Intel 82599ES
Holder:	Not included
I/O:	LC located on internal bracket
Weight:	190 gram (6.702 oz)
Power Consumption (SR):	6.6W,0.55A at 12V: Typical all ports operate at 10Gbit/s, (Normal Mode). 6.12W, 0.51A at 12V: Typical Bypass Mode. 6.24W, 0.52A at 12V: Typical Disconnect Mode. 6.48W, 0.54A at 12V: Typical No link at all ports
Power Consumption (LR):	6.60 W, 0.55 A at 12V: Typical all ports operate at 10Gb/s. 5.88 W, 0.49 A at 12V: Typical Bypass Mode. 6.00 W, 0.50 A at 12V: Typical Disconnect Mode. 6.36 W, 0.53 A at 12V: Typical No link at all ports
Operating Humidity:	0%–90%, non-condensing

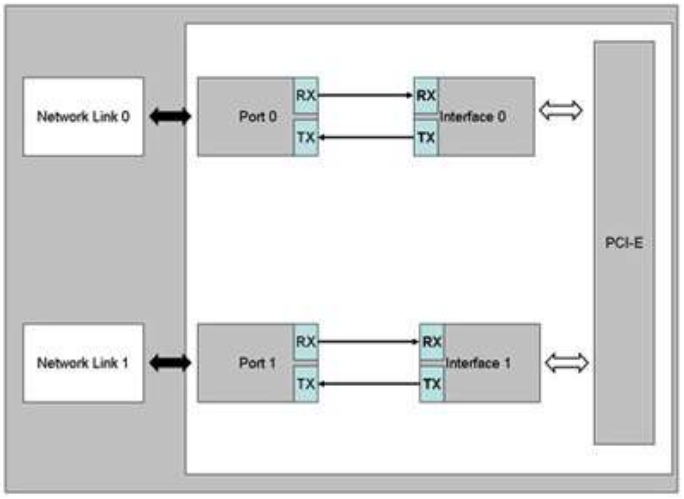
Operating Temperature:	0°C – 50°C (32°F – 122°F)
Storage:	-20°C–65°C (-4°F–149°F)
EMC Certifications:	FCC Part 15, Subpart B Class B Conducted Emissions Radiated Emissions CE EN 55022: 1998 Class B Amendments A1: 2000; A2: 2003 Conducted Emissions Radiated Emissions CE EN 55024: 1998 Amendments A1: 2000; 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
LEDs	
LEDs:	(2) LEDs per port Left LED: Link/Act : Turns on link (Green), Blinks on activity (Green) Right LED : Link Speed / Bypass / Disconnect : Turns on Yellow 1G Link. Turns on Blue 10G Link. Blink Yellow on Disconnect Blink Green on Bypass

LEDs location:	LEDs are located on the PCB, visible via holes in the metal bracket. Each 2 green act/ link and speed link/bypass/disconnect LEDs are located above their own LC connector port- visible by light pipes
Connectors:	(2) LC

Functional Description

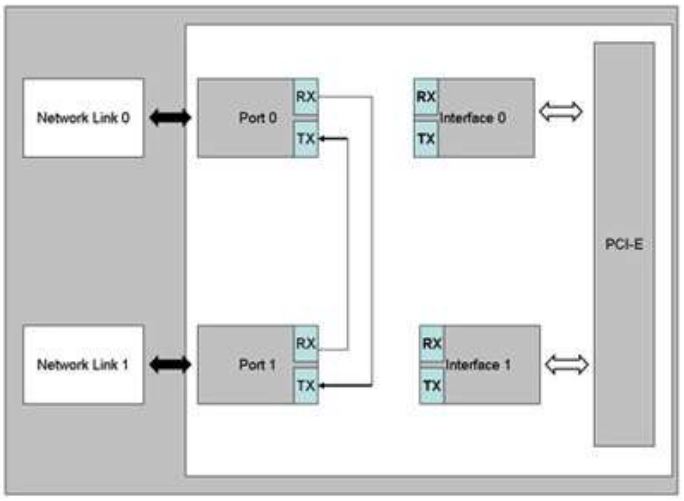
Silicom's Bypass Server adapters support Normal, Bypass and Disconnect modes. In Normal mode, the ports are independent interfaces (see Figure 1: Normal mode, one Bypass pair is illustrated). Figure 1 :

Normal Mode Functional Block Diagram



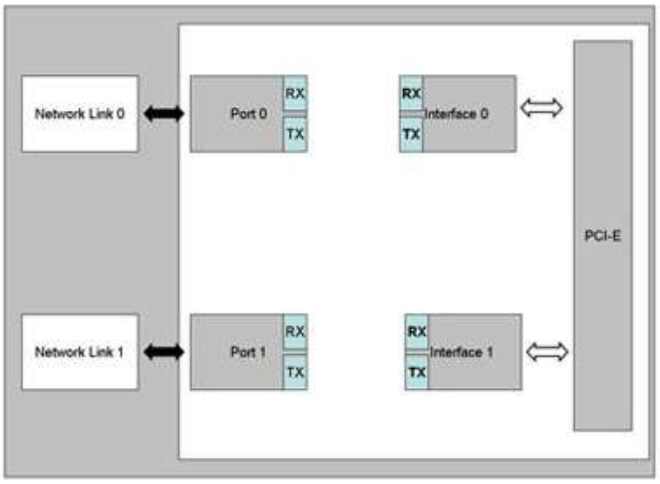
In Bypass mode, the connections of the Ethernet network ports are disconnected from the interfaces and switched over to the other port to create a crossed connection loop-back between the Ethernet ports. The connections of the interfaces are left not connected. (See Figure 2: one Bypass pair illustrated)

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 dual 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
M1E210G2BPI9-SR-SD	Dual Port Fiber (SR) 10 Gigabit Ethernet ExpressModule Bypass Server Adapter	X8, Based on Intel 82599ES, PCI-E ExpressModule, on board support for Fiber SR, RoHS compliant
M1E210G2BPI9-LR-SD	Dual Port Fiber (LR) 10 Gigabit Ethernet ExpressModule Bypass Server Adapter	X8, Based on Intel 82599ES, PCI-E ExpressModule, on board support for Fiber LR, RoHS compliant

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