



### M1E310G4SPi9

#### Quad Port Fiber SFP+ 10 Gigabit Ethernet Express Module Server Adapter Intel® based

#### Product Description

Silicom's Quad Port SFP+ 10 Gigabit Ethernet ExpressModule server adapter is a PCI-Express X8 Four 10 Gigabit Ethernet network interface card that can fit into a 3.5" HD form factor. The Silicom Quad Port SFP+ ExpressModule is the front I/O module in Silicom Server to Network Appliance Converter (SETAC) architecture.

The Silicom 10 Gigabit Ethernet Express Module server adapters are based on Intel 82599ES 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 Express Module 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

##### SFP+ 10Gigabit Ethernet:

10Gigabit Ethernet Adapter with SFP cage support:

##### -XR: Copper 10SFP+Cu (Passive Direct Attach Cable):

- Compliant with the SFP+ MSA SFF-8431 specification
- Up to 10 meters

##### -SR: Fiber 10 Gigabit Ethernet 10GBASE-SR:

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

##### -LR: Fiber 10 Gigabit Ethernet 10GBASE-LR:

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

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

- 1000BASE-SX with 1G 850nM Small form Factor Pluggable (SFP+)
- 10GBASE-SR with 10Gigabit 850nM Small form Factor Pluggable (SFP+)

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

- 1000BASE-LX with 1G 1310nm Small form Factor Pluggable (SFP+)
- 10GBASE-LR with 10Gigabit 1310nm Small form Factor Pluggable (SFP+)

**-SR: Fiber 10 Gigabit Ethernet 10GBASE-SR:**

- 10 Gigabit Fiber Ethernet port supports 10GBASE-SR (850nm LAN PHY)
- 10Gigabit 850nm Small form Factor Pluggable (SFP+)

**-LR: 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+)

**Host Interface:**

- PCI Express X8 lanes
- Support PCI Express Base Specification 3.0 (8GT/sec)
- Low power
- SFP+ cage
- 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 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)
- 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

**LAN Features:**

- 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 and speed
- 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**

<b>SFP+ 10Gigabit Ethernet Technical Specifications Adapters:</b>	
<b>SFP+ (Small Form Factor Pluggable) supports:</b>	SFI interfaces supports 10GBase-R PCS and 10 Gigabit PMA in order to connect with SFP+ to 10GBase-SR // 1000Base-SX / 10GBase-LR and SFP+ Direct Attach
<b>10GBase-SR SFP+: IEEE Standard / Network</b>	Fiber 10Gigabit Ethernet, 10GBASE-SR (850nm LAN PHY)

<b>topology:</b>	
<b>10GBase-SR SFP+: Data Transfer Rate :</b>	10.3125GBd
<b>10GBase-SR SFP+: Cables and Operating distance Up to:</b>	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
<b>10GBase-LR SFP+: IEEE Standard / Network topology:</b>	Fiber 10Gigabit Ethernet, 10GBASE-LR (1310nm LAN PHY)
<b>10GBase-LR SFP+: Data Transfer Rate:</b>	10.3125GBd
<b>10GBase-LR SFP+: Cables and Operating distance Up to:</b>	Single-Mode: 10000m at 9um
<b>10GSFP+Cu : IEEE Standard / Network topology:</b>	Copper 10Gigabit Ethernet, 10GSFP+Cu (Direct Attach)
<b>1000Base-SX / 10GBase-SR SFP+: IEEE Standard / Network topology:</b>	Fiber Gigabit Ethernet, 1000Base-SX (850nm LAN PHY) Fiber 10Gigabit Ethernet, 10GBASE-SR (850nm LAN PHY)
<b>1000Base-SX / 10GBase-SR SFP+: Data Transfer Rate :</b>	10.3125GBd / 1.25GBd
<b>10000Base-SX / 10GBase-SR SFP+: Cables and Operating distance Up to:</b>	10000Base-SX: 62.5um, 160MHz/Km 220m 62.5um, (OM1)200MHz/Km 275m 50um, 400MHz/Km 500m 50um, (OM2)500 MHz/Km 550m 50um, (OM3)2000MHz/Km >550m 10GBase-SR: 62.5um, 160MHz/Km 26m 62.5um, (OM1)200MHz/Km 33m

	<p>50um, 400MHz/Km 66m</p> <p>50um, (OM2)500 MHz/Km 82m</p> <p>50um, (OM3)2000MHz/Km 300m</p>
<p><b>1000Base-LX / 10GBase-LR SFP+:</b></p> <p><b>IEEE Standard / Network topology:</b></p>	<p>Fiber Gigabit Ethernet, 1000Base-LX (1310nm LAN PHY)</p> <p>Fiber 10Gigabit Ethernet, 10GBASE-LR (1310nm LAN PHY)</p>
<p><b>1000Base-LX / 10GBase-LR SFP+:</b></p> <p><b>Data Transfer Rate :</b></p>	<p>10.3125GBd / 1.25GBd</p>
<p><b>1000Base-LX / 10GBase-LR SFP+:</b></p> <p><b>Cables and Operating distance Up to:</b></p>	<p>10000Base-LX:</p> <p>Single-Mode: 5000m at 9um</p> <p>10GBase-LR:</p> <p>Single-Mode: 10000m at 9um</p>
<p><b>– SR: Fiber 10GBASE-SR Ethernet Technical Specifications:</b></p>	
<p><b>Output Transmit Power:</b></p>	<p>Typical: -2.37 dBm</p> <p>Minimum: -7.3 dBm</p>
<p><b>Optical Receive Sensitivity:</b></p>	<p>Typical: -14.6 dBm</p> <p>Maximum: -11 dBm</p>
<p><b>Maximum Input Power:</b></p>	<p>Maximum: +0.5dBm</p>
<p><b>– LR: Fiber 10GBASE-LR Ethernet Technical Specifications:</b></p>	
<p><b>Output Transmit Power:</b></p>	<p>Typical: -2.52 dBm</p> <p>Minimum: -8.2 dBm</p>
<p><b>Optical Receive Sensitivity:</b></p>	<p>Typical: -17.09 dBm</p> <p>Maximum: -14.4 dBm</p>
<p><b>Maximum Input Power:</b></p>	<p>Maximum: +0.5dBm</p>
<p><b>– SRD: Fiber 1000BASE-SX / 10GBASE-SR Technical Specifications:</b></p>	
<p><b>Optical Output Power (1G):</b></p>	<p>Typical: -5.08 dBm</p> <p>Minimum: -9.5 dBm</p>
<p><b>Optical Receive Sensitivity</b></p>	<p>Typical: -21.07 dBm</p>

<b>(1G):</b>	Maximum: -17 dBm
<b>Maximum Input Power (1G):</b>	Maximum: +0.5dBm
<b>Output Transmit Power (10G):</b>	Typical: -2.65 dBm Minimum: -5 dBm
<b>Optical Receive Sensitivity (10G):</b>	Typical: -11.17dBm Maximum: -11.1 dBm
<b>Maximum Input Power (10G):</b>	Maximum: +0.5dBm
<b>– LRD: Fiber 1000BASE-LX / 10GBASE-LR Technical Specifications:</b>	
<b>Optical Output Power (1G):</b>	Typical: -4.82 dBm Minimum: -11 dBm
<b>Optical Receive Sensitivity (1G):</b>	Typical: -19.06 dBm Maximum: -19 dBm
<b>Maximum Input Power (1G):</b>	Maximum: +0.5dBm
<b>Output Transmit Power (10G):</b>	Typical: -2.9 dBm Minimum: -8.2 dBm
<b>Optical Receive Sensitivity (10G):</b>	Typical: -15.03 dBm Maximum: -12.6 dBm
<b>Maximum Input Power (10G):</b>	Maximum: +0.5dBm
<b>Operating Systems Support</b>	
<b>Operating system support:</b>	Windows Linux FreeBSD VMware
<b>General Technical Specifications</b>	
<b>Interface Standard:</b>	PCI ExpressModule Specification revision 1.0 Silicom SETAC PCI-Express Base Specification Revision 3.0 ( 8 GTs)
<b>Board Size:</b>	168.2mm x 98mm (6.62"X3.858")

<b>PCI Express Card Type:</b>	X8 Lane
<b>PCI Express Voltage:</b>	+12V ± 15%
<b>PCI Connector:</b>	X8 Lane
<b>Controller:</b>	Intel 82599ES
<b>Holder:</b>	Not included
<b>I/O:</b>	Quad SFP+ Cage located on edge of the board
<b>Weight:</b>	290 gr (10.23 oz )
<b>Power Consumption (M1E310G4SPi9-XR):</b>	15.6 W 1.3 A at 12V: Typical No SFP+
<b>Power Consumption (M1E310G4SPi9-SR):</b>	18.96 W 1.58 A at 12V: Typical, 10GBASE-SR transceivers are installed in all ports; all ports operate at 10Gb/s. 18.6 W 1.55 A at 12V: Typical, No link at all ports
<b>Power Consumption (M1E310G4SPi9-LR):</b>	19.2 W 1.6 A at 12V: Typical, 10GBASE-LR transceivers are installed in all ports; all ports operate at 10Gb/s. 18.84 W 1.57 A at 12V: Typical, No link at all ports
<b>Power Consumption (M1E310G4SPi9-SRD):</b>	19.32 W 1.61 A at 12V: Typical, 10GBASE-SR transceivers are installed in all ports; all ports operate at 10Gb/s. 15.72 W 1.31 A at 12V: Typical, 1GBASE-SX transceivers are installed in all ports; all ports operate at 1Gb/s. 18.96W 1.58 A at 12V: Typical, No link at all ports
<b>Power Consumption (M1E310G4SPi9-LRD):</b>	19.68 W 1.64 A at 12V: Typical, 10GBASE-LR transceivers are installed in all ports; all ports operate at 10Gb/s. 16.32W 1.36 A at 12V: Typical, 1GBASE-LX transceivers are installed in all ports; all ports operate at 1Gb/s. 19.32 W 1.61 A at 12V: Typical, No link at all ports
<b>Power Consumption (M1E310G4SPi9-DA):</b>	17.4 W 1.45 A at 12V: Typical, SFP+ direct attach Copper Cables are installed in all ports; all ports operate at 10Gb/s. 17.04 W 1.42 A at 12V: Typical, No link at all ports
<b>Operating Humidity:</b>	0%–90%, non-condensing

<b>Operating Temperature:</b>	-5°C – 40°C (23°F – 104°F)
<b>Storage:</b>	-40°C–65°C (-40°F–149°F)
<b>EMC Certifications:</b>	<p>FCC Part 15, Subpart B Class A</p> <p>Conducted Emissions</p> <p>Radiated Emissions</p> <p>CE EN 55022: 1998 Class B Amendments A1: 2000; A2: 2003</p> <p>Conducted Emissions</p> <p>Radiated Emissions</p> <p>CE EN 55024: 1998 Amendments A1: 2000; A2: 2003</p> <p>Immunity for ITE Amendment A1: 2001</p> <p>CE EN 61000-3-2 2000, Class A</p> <p>Harmonic Current Emissions</p> <p>CE EN 61000 3-3 1995, Amendment A1: 2001</p> <p>Voltage Fluctuations and Flicker</p> <p>CE IEC 6100-4-2: 1995</p> <p>ESD Air Discharge 8kV. Contact Discharge 4kV.</p> <p>CE IEC 6100-4-3:1995</p> <p>Radiated Immunity (80-1000Mhz), 3V/m 80% A.M. by 1kHz</p> <p>CE IEC 6100-4-4:1995</p> <p>EFT/B: Immunity to electrical fast transients 1kV Power Leads, 0.5Kv Signals Leads</p> <p>CE IEC 6100-4-5:1995</p> <p>Immunity to conductive surges COM Mode; 2kV, Dif. Mode 1kV</p> <p>CE IEC 6100-4-6:1996</p> <p>Conducted immunity (0.15-80 MHz) 3VRMS 80% A.M. By 1kHz</p> <p>CE IEC 6100-4-11:1994</p> <p>Voltage Dips and Short Interruptions</p> <p>V reduc &gt;95%, 30% &gt;95% Duration 0.5per, 25per, 250per</p>
<b>MTBF*:</b>	<p>36 (Years)</p> <p>* According to Telcordia SR-332 Issue 2. Environmental condition – GB (Ground, Fixed, and Controlled). Ambient temperature 40°C</p>
<b>LEDs</b>	
<b>LEDs:</b>	<p>(2) LEDs per port</p> <p>Left LED: Link/Act :</p> <p>Turns on link (Green),</p> <p>Blinks on activity (Green)</p> <p>Right LED : Link Speed:</p> <p>Turns on Blue 10G Link.</p>



	Turns on Yellow 1G Link
<b>LEDs location:</b>	LEDs are located on the PCB, visible via holes in the metal bracket. Each Green Link/Act and LED and Yellow/ Blue Link Speed LED is located above its own SFP connector port by light pipes.
<b>Connectors:</b>	Quad SFP+ cage

## Order Information

P/N	Description	Notes
<b>M1E310G4SPI9-XR</b>	Quad Port SFP+ 10 Gigabit Ethernet Express Module Server Adapter	X8 Gen2 , Based on Intel 82599ES, Support Direct Attached Copper cable, Support Silicom SFP+ approved transceiver. RoHS compliant
<b>M1E310G4SPI9-SR</b>	Quad Port Fiber (SR) 10 Gigabit Ethernet Express Module Server Adapter	X8, Based on Intel 82599ES, PCI-E adapter, on board support for Fiber SR, RoHS compliant
<b>M1E310G4SPI9-LR</b>	Quad Port Fiber (LR) 10 Gigabit Ethernet Express Module Server Adapter	X8, Based on Intel 82599ES, PCI-E adapter, on board support for Fiber LR, RoHS compliant
<b>M1E310G4SPI9-SRD</b>	Quad Port Fiber (SX/ SR) 1/ 10 Gigabit Ethernet Express Module Server Adapter	X8, Based on Intel 82599ES, PCI-E adapter, on board support for Fiber SX/ SR, RoHS compliant
<b>M1E310G4SPI9-LRD</b>	Quad Port Fiber (LX/LSR) 1/ 10 Gigabit Ethernet Express Module Server Adapter	X8, Based on Intel 82599ES, PCI-E adapter, on board support for Fiber LX/ LR, RoHS compliant

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