

# XGE High Performance Ethernet

## XGE4123-CCXMC-RC-G Data Sheet: Dual Port 10 Gb Ethernet CCXMC (rear KX4 / XAUI)

### XGE4123 CCXMC Conduction Cooled XMC

The XGE4123-CCXMC provides 10 Gb Ethernet (10GbE) connectivity for embedded systems with the ultra-high performance characteristics that are essential for data intensive real-time systems. It provides high performance RDMA and Streaming protocol in addition to 100% compatibility and interoperability with all industry standard Ethernet infrastructures and protocols.

The XGE4123-CCXMC implements a dual port 10Gb Ethernet NIC with a PCIe x8 host interface. The XGE4123 offloads TCP/IP, RDMA, and UDP Direct stream protocols to dedicated silicon protocol engines with each port capable of 2.5 GB/s of sustained throughput. (Note that the aggregate rate may be limited by the host PCIe port)

### XGE Hardware Offload Advantage

Ethernet interfaces can stifle the performance of even the most powerful embedded CPUs when trying to move data at high rates at full wire speed. This is due to the significant overhead caused by the TCP/IP protocol stack (i.e. “software stack”) in traditional Ethernet implementations. This problem gets many times worse when attempting to leverage the performance of 10 GbE. The XGE series offloads most of the network protocol processing to dedicated silicon protocol engines and frees the I/O protocol processing from the host CPU. The XGE product family differentiates itself from typical Ethernet NICs by delivering high sustained throughput, maximum host processor offload, ultra-low latency, and solid deterministic behavior.

### UDP Direct Stream Support

UDP Direct Streaming send/receive allows extremely efficient large sends and receives of UDP data directly from application level buffers, completely avoiding the standard O/S network stack and associated data copies. The application send/receive buffers may be located in host CPU memory, or in any other PCIe addressable memory, such as the memories attached to PCIe connected Graphic Processing Units (GPUs). UDP Direct Streaming is fully compatible with standard UDP.

### RDMA Support

When used in conjunction with a Data Center Ethernet (DCE) switches, XGE Interfaces supports the Ethernet Remote Direct Memory Access (RDMA) protocol. RDMA allows data movement directly between application memories without any CPU involvement. RDMA provides a mechanism for extremely efficient data transfer with ultra-low microsecond level board to board latencies on DCE enabled Ethernet networks.



### XGE4123-CCXMC-RC-G Features:

- Dual 10 GbE ports with PCIe x8 host interface
- Rear KX4/XAUI I/O through XMC connectors
- Simultaneous line rate throughput on all ports
- UDP direct streaming support
- RDMA support (with DCE enabled switches)
- 100% standard Ethernet compatibility
- Standard Sockets programming interface
- Highly efficient large send/receive offload
- Very low host processor overhead
- Ultra-low latency and high determinism
- Zero Copy / Direct Data Placement (into app memory)
- Very low power consumption
- Air and rugged conduction cooled versions available
- Software drivers for Linux, VxWorks, Windows
- Common drivers also support legacy XGE XMCs

### Extensive Software Support & Capability

Critical I/O supplies all the hardware, drivers, libraries, and protocol support you'll need for rapid system development without wasting your time debugging drivers. All software has been highly optimized to deliver maximum performance, reliability, and capability.

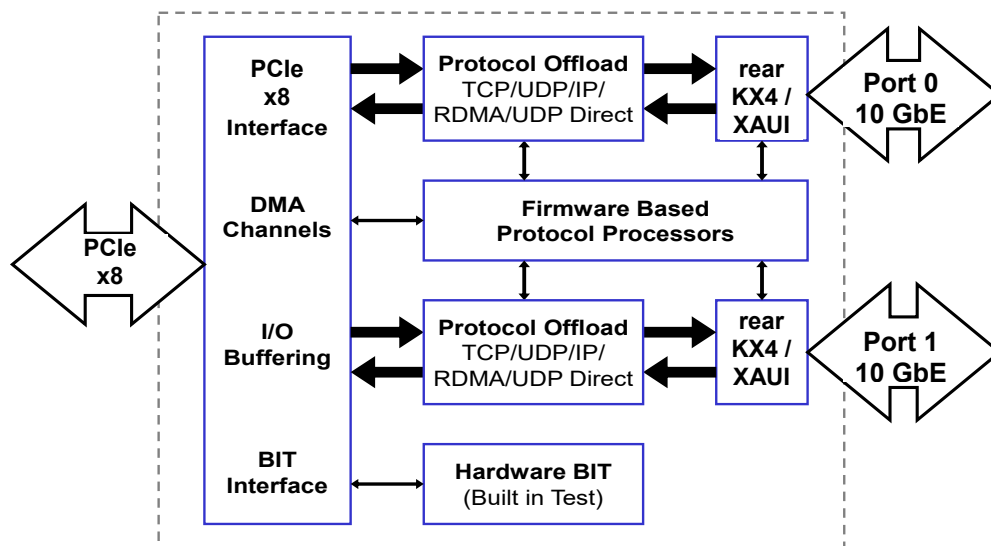
The XGE4123 hardware is accompanied by an extensive offering of software libraries and device drivers with support for a multitude of embedded / real-time operating systems as well as mainstream OS platforms (VxWorks, Linux, and Windows).

### Compatibility

The XGE4123 interfaces provide 100% standard 10 Gb Ethernet connectivity. The XGE sockets interface model maintains full compatibility with all applications, including both custom user applications as well as “pre-built” network applications such as NFS, FTP, Telnet, etc.

## XGE4123-CCXMC-RC-G Technical Specifications

|                           |  |
|---------------------------|--|
| Controller Architecture   | Hardware protocol offload processor  |
| Ethernet Bit Rate         | 10 Gbps  |
| Data Transfer Rate        | 2.5 GB/s (per port, full-duplex)   |
| Protocol Support          | TCP, UDP, IP, UDP Direct Streaming, RDMA, all other standard network protocols   |
| Host Bus Interface        | PCIe x8 (x4, x2, x1 supported), PCIe 3.0 (2.0 and 1.1 compatible), 8GT/s, 5GT/s or 2.5GT/s<br>(NOTE: 8GT/s XMC operation requires a very well designed VITA61 baseboard. 5GT/s XMC operation requires a well designed baseboard. Users should carefully verify PCIe operation) |
| Ports                     | Dual Copper 10GBase-KX4/XAUI rear I/O  |
| Connectors                | Rear KX4/XAUI I/O through XMC connectors   |
| Form Factor               | Conduction Cooled XMC VITA 42.0, VITA 42.3, VITA 20-2001 (R2005)<br>VITA 61 XMC2 connectors available  |
| Power Requirements        | +5VDC at 2A (max) or +12VDC at 1A (max)  |
| Power Consumption         | 5.5 Watts (typical)  |
| Operating Temperature     | At XMC thermal interface, R2: -40C to +85C   |
| Storage Temperature       | -55C to +105C  |
| Operating Humidity        | 0-95% non condensing   |
| Storage Humidity          | 0-100% condensing  |
| Supported Host Processors | Intel, PowerPC   |
| Vibration (random)        | VITA 47 Class V3: 0.1g <sup>2</sup> /Hz (14.1 grms) 100-1000 Hz  |
| Shock                     | VITA 47 Class OS2 40g Peak sawtooth (11ms duration)  |
| Software Support          | Drivers: VxWorks, Linux, Windows (protocol support varies by OS, contact Critical I/O)   |
| Base Model Numbers        | XGE4123-CCXMC-RC-G-R2 (VITA 42 XMC connectors, no bezel)<br>XGE4123-CCXMC6-RC-G-R2 (VITA 61 XMC connectors, no bezel)<br>XGE4123-CCXMC1-RC-G-R2 (VITA 42 XMC connectors, with bezel)   |
| Model Description         | Dual port 10 Gigabit Ethernet TOE XMC, rear I/O XAUI/KXR copper interface, R2 rugged level: -40°C to +85°C at XMC thermal interfaces, Parylene C conformal coating, conduction-cooled hardware, RoHS LEAD FREE assembly  |



**Block Diagram:** Functional block diagram for the XGE4123 CCXMC by Critical I/O. This CCXMC provides dual independent 10 Gb Ethernet ports, each with integrated protocol offload hardware. Dedicated hardware offload provides full duplex operation at wire-speed, up to 2.5 GB/s (per port).