

# XGE High Performance Ethernet

## XGE4043-XMC-FF-G Data Sheet: Dual Port 1 Gb Ethernet XMC (front LC optical)

### XGE4043 XMC Air Cooled XMC

The XGE4043-XMC provides 1 Gb Ethernet (1GbE) 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 XGE4043-XMC implements a dual port 1Gb Ethernet NIC with a PCIe x8 host interface. The XGE4043 offloads TCP/IP, RDMA, and UDP Direct stream protocols to dedicated silicon protocol engines with each port capable of 250 MB/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.



### XGE4043-XMC-FF-G Features:

- Dual 1 GbE ports with PCIe x8 host interface
- SFP optical transceivers (LC 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.

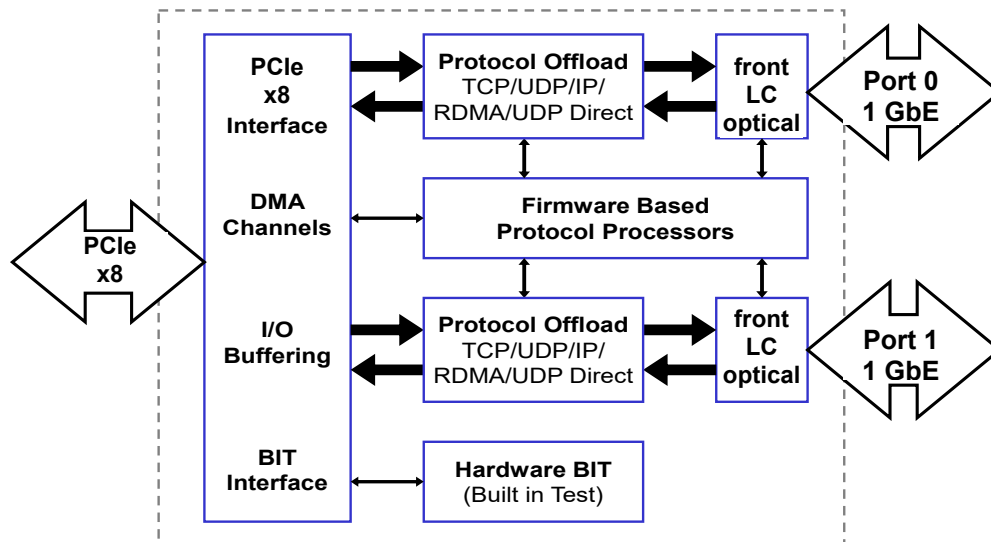
The XGE4043 hardware is accompanied by an extensive offering of software libraries and device drivers with support for a multitude of embedded / real-time operating systems as well as mainstream OS platforms (VxWorks, Linux, and Windows).

### Compatibility

The XGE4043 interfaces provide 100% standard 1 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.

## XGE4043-XMC-FF-G Technical Specifications

Controller Architecture	Hardware protocol offload processor
Ethernet Bit Rate	1 Gbps
Data Transfer Rate	250 MB/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 (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 Optical 1000Base-SR front panel ports
Connectors	SFP optical transceivers (LC connectors)
Form Factor	Air Cooled XMC, VITA 42.0, VITA 42.3 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 300 LFM, Std: 0C to +55C, ET1: -40C to +71C, ET2: -40C to +85C
Storage Temperature	-40C to +85C
Operating Humidity	Std: 10-90% non-condensing, ET1/ET2: 0-95% non-condensing
Storage Humidity	Std: 5-95% non-condensing, ET1/ET2: 0-100% condensing
Supported Host Processors	Intel, PowerPC
Vibration (random)	VITA 47 Class V2: 0.04g <sup>2</sup> /Hz (14.1 grms) 100-1000 Hz
Shock	VITA 47 Class OS1 20g Peak sawtooth (11ms duration)
Software Support	Drivers: VxWorks, Linux, Windows (protocol support varies by OS, contact Critical I/O)
Base Model Numbers	XGE4043-XMC-FF-G (VITA 42 connectors) XGE4043-XMC6-FF-G (VITA 61 connectors)
Model Description	Dual port 1 Gigabit Ethernet TOE XMC, front LC optical, commercial temp, air-cooled hardware, RoHS LEAD FREE assembly



**Block Diagram:** Functional block diagram for the XGE4043 XMC by Critical I/O. This XMC provides dual independent 1 Gb Ethernet ports, each with integrated protocol offload hardware. Dedicated hardware offload provides full duplex operation at wire-speed, up to 250 MB/s (per port).