TOE Controller

Dual 1-Gbps Ethernet to
133-MHz PCI-X TOE Controller

EP4032

Higher Performance
- Networking and storage functionality for iSCSI, network attached storage (NAS), clustering, multimedia, distributed network applications, and web-serving
- High performance networking with full-duplex flow control
- Jumbo frames, 802.3x flow control, 802.1p priority service, and 802.1Q VLAN
- Full hardware state based TCP/IP offload including fragmentation, reassembly, and out-of-order processing
- SCSI, RDMA, TCP, UDP, IP, and Ethernet MAC offload interfaces

Superior Scalability
- Dual port 100/1000 BASE-T
- VLANs and QoS support
- IPv4 and IPv6 support

Enhanced Reliability
- Storage reliability with iSCSI digests, ECC memory, and overlapping data path parity
- JTAG boundary scan, full scan, and memory built-in self-test (BIST)
- T10 block CRC protection on PCI backplane, ECC memory, and data path parity
- Highly integrated, low power design

- Complete TCP/IP offload
- PCI-X 1.0a host bus
- Enhanced statistical information

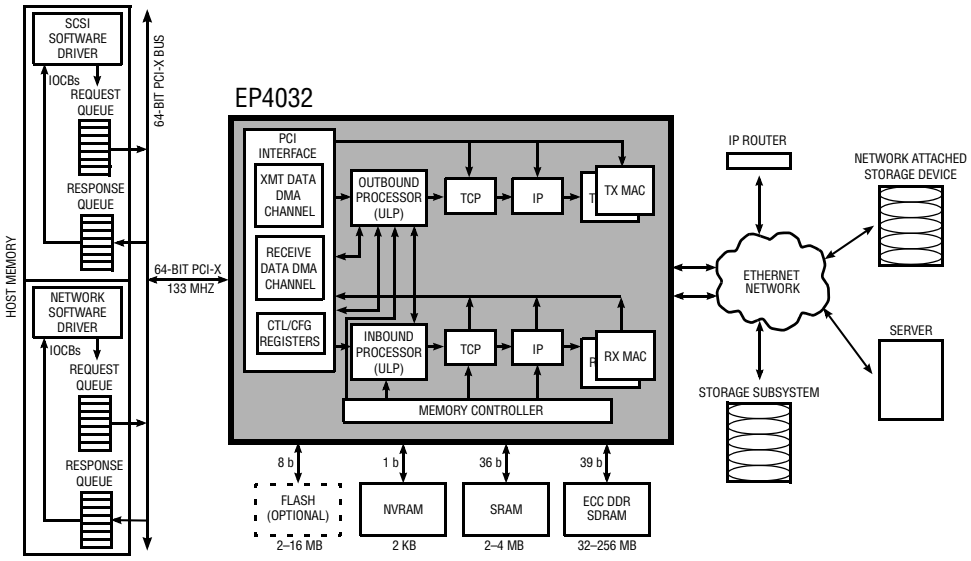
LOW POWER, HARDWARE STATE-BASED TCP/IP OFFLOAD ENGINE. The EP4032 is a highly integrated, single-chip, bus master, dual channel, 1-Gbps Ethernet to PCI-X controller featuring a complete state-based TCP/IP offload engine (TOE) for embedded subsystems as well as other networking and iSCSI storage applications. By offloading TCP/IP at an operating clock frequency of only 125 MHz, the EP4032 delivers a highly integrated, low power, high performance 1-Gbps Ethernet solution. Dedicated state-based logic eliminates expensive code memory, CPU processing, interrupts, instruction execution, and memory accesses associated with supporting TCP/IP in software for Gigabit Ethernet networking applications.

FULL TCP/IP PROTOCOL OFFLOAD. The EP4032 offloads all the bulk data movement functions of TCP/IP, including checksum calculations, IP fragmentation/re-assembly, congestion avoidance, re-transmissions, acknowledgements, ordering, segmentation, and address filtering, providing a complete TCP networking solution for the host operating system. Full TCP/IP protocol offload makes the EP4032 an ideal solution for all TCP networking configurations while providing a simple programming interface for drivers.

VERSATILE UPPER LAYER PROTOCOL PROCESSING. The EP4032 contains two embedded 32-bit RISC processors for inbound and outbound header parsing and protocol processing. These processors allow for further acceleration of common TOE applications and upper layer protocols. The EP4032 supports for full iSCSI offload for IP storage applications, and direct data placement (DDP) for high performance interconnect.

END-TO-END DATA PROTECTION. The EP4032 provides the latest industry data protection features, delivering true end-to-end reliability. T10 block CRC, iSCSI header digest, and iSCSI data digest support over-the-network data protection and PCI reliability. ECC memory support and internal byte-wide parity provide complete end-to-end data protection from the host and through the chip. The EP4032 provides end-to-end data protection mandatory for high-end Ethernet applications, NAS, IP storage, clustering, and high performance interconnect.

HIGH PERFORMANCE NETWORKING. Seamlessly mix and match the EP4032 with existing high performance Ethernet networks. Advanced standard networking features are coupled with the latest in TCP/IP offload technology, providing a high performance Ethernet solution. The EP4032 supports existing high performance Ethernet features including 802.1Q VLANs, 802.1p QoS, 802.3x flow control, and auto-negotiation. The EP4032 provides enhanced diagnostics by offering iSCSI, TCP, and Ethernet statistical data.



Host Bus Interface Specifications	
Speed	64-bit, 133-MHz PCI-X, backward compatible to 32-bit, 32/64-bit PCI
Voltage	3.3 V
Compliance	Conforms to *PCI Local Bus Specification* rev. 2.3, *PCI-X Specification* rev. 1.0a, *PCI Bus Power Management Interface Specification* rev. 1.1 (PC99)
DMA channels	18-channel DMA controller
Other features	64-bit host memory addressing, 32-bit PCI target, pipelined DMA registers for efficient scatter/gather operations, 32-bit DMA transfer counter for large I/O transfer lengths

TOE Specifications	
MAC functions	User datagram protocol (UDP) checksum and TCP checksum offloads
TCP functions	TCP connection migration; New Reno retransmission algorithm; TCP checksums, acknowledgements, and retransmissions; segmentation and reassembly; out-of-order processing; congestion control techniques including slow start, congestion avoidance, fast retransmission, and fast recovery; 10 ms TCP timer granularity
Architecture	Hardware state machine based
IP functions	IPv4, IPv6, IP fragmentation and reassembly
Compliance	Internet engineering task force (IETF): *iSCSI* (see the QLogic® web site for updates: www.qlogic.com/support), *iSCSI Requirements and Design Considerations, iSCSI Naming and Discovery, Internet Protocol Specification (IPv4)*, RFC793, *Transmission Control Protocol (TCP) Specification*, RFC1122, *Requirements for Internet Hosts—Communication Layers*, RFC1323, *TCP Extensions for High Performance*, RFC2581, *TCP Congestion Control*. ANSI SCSI: *SCSI-3 Architecture Model* (SAM), X3T10/994D/Rev 18, *SCSI-3 Controller Command Set*, X3T10/Project 1047D/Rev 6c. IEEE: 802.1Q *Virtual LAN (VLAN)*, 802.1p *Priority of Service*, 802.3*x Flow Control*, 802.3ad *Link Aggregation*, RFC2460: *Internet protocol, Version 6* (IPv6)

Ethernet Specifications	
Interface Type	Multiplexed GMII and 10-bit interface to connect to a SERDES or PHY for optical or copper links
Speed	Autonegotiated 100/1000 Mbps
Flow control	Yes: symmetrical and asymmetrical (autonegotiated)

Physical Specifications	
Port	Dual 1-Gbps Ethernet
Package	EP4032 R: 596-pin thermally enhanced plastic ball grid array (EPBGA-T), 35 mm × 35 mm

Environment and Equipment Specifications	
Airflow	100 LFM (0.5 m/sec)
Temperature	Operating: 0°C/32°F to 55°C/131°F. Storage: -20°C/-4°F to 70°C/158°F
Power supply	1.8V, 2.5V, and 3.3V
Power dissipation	4 watts (maximum)

Ordering Information	
EP4032	Ships in a single tray (quantity 21) or block of 10 trays (quantity 210). Available in standard and RoHS-compliant packages.

FM29583

QLOGIC

QLogic Corporation
26650 Aliso Viejo Parkway
Aliso Viejo, CA
92656
949.389.6000

QLogic (UK) Ltd.
Surrey Technology Centre
40 Occam Road Guilford
Surrey GU2 7YG UK
+44 (0) 1483 295825

WWW.QLOGIC.COM