

ThinkSystem Marvell QL41232 10/25GbE SFP28 Ethernet Adapters

Product Guide

The ThinkSystem Marvell QL41232 10/25GbE SFP28 Ethernet Adapters are based on eighth-generation technology from Marvell and feature Universal Remote Direct Memory Access (RDMA) to offer concurrent support for RoCE, RoCE v2, and iWARP. The adapters are available in PCIe and OCP form factors.

They are suitable for existing 10Gb customers who want to maintain 10Gb network support and want the investment protection of supporting 25GbE network speeds, but don't need FCoE or iSCSI support.

The following figure shows the ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port PCIe Ethernet.

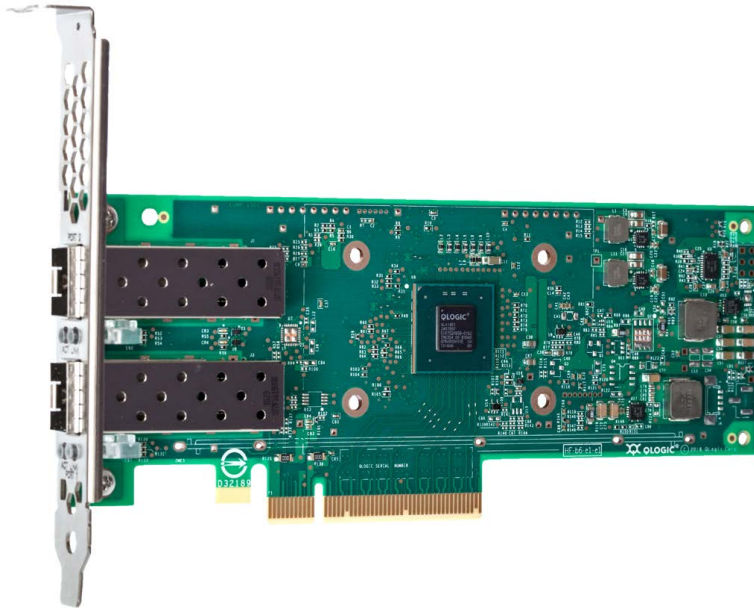


Figure 1. ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port PCIe Ethernet (heatsink removed)

Did you know?

The QL41262 adapters and QL41232 adapters only differ in that the QL41232 adapters do not support the CNA functions, FCoE and iSCSI. All Ethernet functionality remains the same across the two adapter families.

The adapter supports FastLinQ SmartAN auto-negotiation for simplified connectivity with switches without user intervention. SmartAN automates the connection and control of 10Gb and 25Gb connections based on the capabilities of the cables and switches used. This technology ensures that the connection is made with the highest possible speed with highest possible reliability.

Part number information

The ordering information is listed in the following table.

Table 1. Ordering information

Part number	Feature code	Description
4XC7A08264	B5SW	ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port OCP Ethernet Adapter
4XC7A08270	B652	ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port PCIe Ethernet Adapter

The adapters, when shipped as a stand-alone part number option, include the following items:

- One adapter
- PCIe adapter only: Full-height (3U) bracket attached with low-profile (2U) bracket included in the box
- Documentation flyer

The following figure shows the OCP adapter.

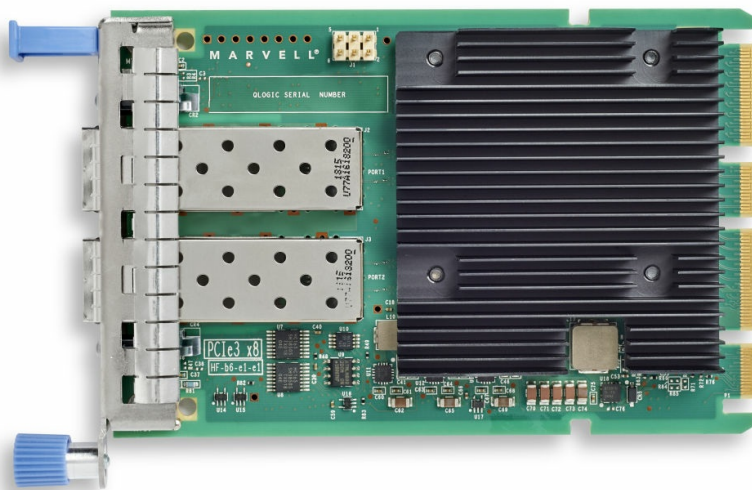


Figure 2. ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port OCP Ethernet Adapter

Supported transceivers and cables

The adapter has an empty SFP28 cage for connectivity. The adapter either supports a connection to a 1Gb, 10 Gb or 25 Gb switch or can share a connection to a 100 Gb switch using a 4:1 breakout cable.

The following table lists the supported transceivers.

Table 2. Transceivers

Part number	Feature code	Description
1Gb transceivers		
00FE333	A5DL	SFP 1000Base-T (RJ-45) Transceiver
10Gb transceivers		
46C3447	5053	SFP+ SR Transceiver
49Y4218	0064	QLogic 10Gb SFP+ SR Optical Transceiver
49Y4216	0069	Brocade 10Gb SFP+ SR Optical Transceiver
90Y9412	A1PM	SFP+ LR Transceiver
7G17A03130	AVV1	Lenovo 10GBaseT SFP+ Transceiver
00FE331	B0RJ	10GBASE-LR SFP+Transceiver
25Gb transceivers		
7G17A03537	AV1B	Lenovo 25GBase-SR SFP28 Transceiver

The following table lists the supported fiber optic cables and Active Optical Cables.

Table 3. Optical cables

Part number	Feature code	Description
LC-LC OM3 Fiber Optic Cables (these cables require a transceiver)		
00MN499	ASR5	Lenovo 0.5m LC-LC OM3 MMF Cable
00MN502	ASR6	Lenovo 1m LC-LC OM3 MMF Cable
00MN505	ASR7	Lenovo 3m LC-LC OM3 MMF Cable
00MN508	ASR8	Lenovo 5m LC-LC OM3 MMF Cable
00MN511	ASR9	Lenovo 10m LC-LC OM3 MMF Cable
00MN514	ASRA	Lenovo 15m LC-LC OM3 MMF Cable
00MN517	ASRB	Lenovo 25m LC-LC OM3 MMF Cable
SFP+ 10Gb Active Optical Cables		
00YL634	ATYX	Lenovo 1M SFP+ to SFP+ Active Optical Cable
00YL637	ATYY	Lenovo 3M SFP+ to SFP+ Active Optical Cable
00YL640	ATYZ	Lenovo 5M SFP+ to SFP+ Active Optical Cable
00YL643	ATZ0	Lenovo 7M SFP+ to SFP+ Active Optical Cable
00YL646	ATZ1	Lenovo 15M SFP+ to SFP+ Active Optical Cable
00YL649	ATZ2	Lenovo 20M SFP+ to SFP+ Active Optical Cable
SFP28 25Gb Active Optical Cables		
7Z57A03541	AV1F	Lenovo 3m 25G SFP28 Active Optical Cable
7Z57A03542	AV1G	Lenovo 5m 25G SFP28 Active Optical Cable
7Z57A03543	AV1H	Lenovo 10m 25G SFP28 Active Optical Cable

Part number	Feature code	Description
7Z57A03544	AV1J	Lenovo 15m 25G SFP28 Active Optical Cable
7Z57A03545	AV1K	Lenovo 20m 25G SFP28 Active Optical Cable
100G Breakout OM4 MPO Cables (these cables require a transceiver)		
7Z57A03573	AV2B	Lenovo 1m MPO to 4x LC Breakout OM4 MMF Cable
7Z57A03574	AV2C	Lenovo 3m MPO to 4x LC Breakout OM4 MMF Cable
7Z57A03575	AV2D	Lenovo 5m MPO to 4x LC Breakout OM4 MMF Cable
QSFP28 100Gb Breakout Active Optical Cables		
7Z57A03551	AV1R	Lenovo 3m 100G to 4x25G Breakout Active Optical Cable
7Z57A03552	AV1S	Lenovo 5m 100G to 4x25G Breakout Active Optical Cable
7Z57A03553	AV1T	Lenovo 10m 100G to 4x25G Breakout Active Optical Cable
7Z57A03554	AV1U	Lenovo 15m 100G to 4x25G Breakout Active Optical Cable
7Z57A03555	AV1V	Lenovo 20m 100G to 4x25G Breakout Active Optical Cable

The following table lists the supported direct-attach copper (DAC) cables.

Table 4. Copper cables

Part number	Feature code	Description
SFP+ 10Gb Passive DAC Cables		
00D6288	A3RG	0.5m Passive DAC SFP+ Cable
90Y9427	A1PH	1m Passive DAC SFP+ Cable
00AY764	A51N	1.5m Passive DAC SFP+ Cable
00AY765	A51P	2m Passive DAC SFP+ Cable
90Y9430	A1PJ	3m Passive DAC SFP+ Cable
90Y9433	A1PK	5m Passive DAC SFP+ Cable
00D6151	A3RH	7m Passive DAC SFP+ Cable
SFP28 25Gb Passive DAC Cables		
7Z57A03557	AV1W	Lenovo 1m Passive 25G SFP28 DAC Cable
7Z57A03558	AV1X	Lenovo 3m Passive 25G SFP28 DAC Cable
7Z57A03559	AV1Y	Lenovo 5m Passive 25G SFP28 DAC Cable
QSFP28 100G-to-4x25G Breakout Cables		
7Z57A03564	AV22	Lenovo 1m 100G QSFP28 to 4x25G SFP28 Breakout DAC Cable
7Z57A03565	AV23	Lenovo 3m 100G QSFP28 to 4x25G SFP28 Breakout DAC Cable
7Z57A03566	AV24	Lenovo 5m 100G QSFP28 to 4x25G SFP28 Breakout DAC Cable

Features

The ThinkSystem Marvell QL41232 10/25GbE SFP28 Ethernet Adapters have the following key features:

Cost effective single-lane connection

The 25 Gbps Ethernet specification enables network bandwidth to be cost-effectively scaled in support of next-generation server and storage solutions residing in cloud and Web-scale data center environments. 25GbE results in a single-lane connection similar to existing 10GbE technology—but it delivers 2.5 times greater bandwidth. Compared to 40GbE solutions, 25GbE technology provides superior switch port density by requiring just a single lane (versus four lanes with 40GbE), along with lower costs and power requirements. Marvell is a leading innovator driving 25GbE technologies across enterprise and cloud market segments.

High performance Universal RDMA Offload

The Lenovo QL41232 Adapter supports RoCE and iWARP acceleration to deliver low latency, low CPU utilization, and high performance on iSER and Windows Server Message Block (SMB) Direct 3.0 / 3.02. QL41232 25GbE adapters have the unique capability to deliver Universal RDMA that enables RoCE, RoCEv2, and iWARP. Marvell Universal RDMA and emerging low latency I/O bus mechanisms such as Network File System over RDMA (NFS over RDMA) and Non-Volatile Memory Express (NVMe) allow customers to accelerate access to data. Marvell's cutting-edge offloading technology increases cluster efficiency and scalability to many thousands of nodes.

High density server virtualization

The latest hypervisors and multicore systems use several technologies to increase the scale of virtualization. The Lenovo QL41262 Adapter supports:

- VMware NetQueue
- Windows Hyper-V Virtual Machine Queue (VMQ)
- Linux Multiqueue
- Windows, Linux, and VMware switch-independent NIC partitioning (NPAR)
- Windows Hyper-V, Linux Kernel-based Virtual Machine (KVM), and VMware ESXi SR-IOV

These features provide ultimate flexibility, quality of service (QoS), and optimized host and virtual machine (VM) performance while providing full 25Gbps bandwidth per port. Public and private cloud virtualized server farms can now achieve 2.5 times the VM density for the best price and VM ratio.

Wire-speed network virtualization

Enterprise-class data centers can be scaled using overlay networks to carry VM traffic over a logical tunnel using NVGRE, GRE, VXLAN, and GENEVE. Although overlay networks can resolve virtual Local Area Network (VLAN) limitations, native stateless offloading engines are bypassed, which places a higher load on the system's CPU. The Lenovo QL41232 Adapter efficiently handles this load with advanced NVGRE, GRE, VXLAN, and GENEVE stateless offload engines that access the overlay protocol headers. This access enables traditional stateless offloads of encapsulated traffic with native-level performance in the network. Additionally, the QL41232 25GbE adapter supports VMware NSX and Open vSwitch (OVS).

Hyperscale Orchestration With OpenStack

The Lenovo QL41232 Adapter supports the OpenStack open source infrastructure for constructing and supervising public, private, and hybrid cloud computing platforms. It provides for both networking and storage services (block, file, and object) for iSER. These platforms allow providers to rapidly and horizontally scale VMs over their entire, diverse, and widely spread network architecture to meet the real-time needs of their customers. Marvell's integrated, multiprotocol management utility, QConvergeConsole (QCC), provides breakthrough features that allow customers to visualize the OpenStack-orchestrated data center using auto-discovery technology.

Accelerate NFV workloads

In addition to OpenStack, the Lenovo QL41232 Adapter supports Network Function Virtualization (NFV) that allows decoupling of network functions and services from dedicated hardware (such as routers, firewalls, and load balancers) into hosted VMs. NFV enables network administrators to flexibly create network functions and services as they need them, reducing capital expenditure and operating expenses, and enhancing business and network services agility. Marvell 25GbE technology is integrated into the Data Plane Development Kit (DPDK) and can deliver up to 60 million packets per second to host the most demanding NFV workloads.

Specifications

The adapter has the following technical specifications:

- Marvell FastlinQ 41000 ASIC
- PCIe 3.0 x8 host interface
- Two available form factors:
 - PCIe low profile form factor
 - Open Compute Project (OCP) form factor (OCP 3.0)
- Supports Message Signal Interrupt (MSI-X)
- Two SFP28 external connectors supporting a transceiver, direct-attach copper (DAC) cable or active optical cable (AOC).
- Support for PXE boot, iSCSI boot and Wake-on-LAN (WOL)
- Networking Features
 - Jumbo frames (up to 9600-Byte)
 - 802.3x flow control
 - Link Aggregation (IEEE 802.1AX-2008)
 - Virtual LANs-802.1q VLAN tagging
 - Configurable Flow Acceleration
 - Congestion Avoidance
 - IEEE 1588 and Time Sync
 - Forward Error Correction Clause 74, Clause 91 support over 25 Gbps
- Performance
 - Data Plane Development Kit (DPDK) support
 - Maximum 60 Million packets per second
 - Low latency
 - 25Gbps line rate per-port in 25GbE mode
 - 10Gbps line rate per-port in 10GbE mode

- Stateless Offload Features
 - IP, TCP, and user datagram protocol (UDP) checksum offloads
 - TCP segmentation offload (TSO)
 - Large send offload (LSO)
 - Giant send offload (GSO)
 - Large receive offload (LRO) (Linux)
 - Receive segment coalescing (RSC) (Windows)
 - Receive side scaling (RSS)
 - Transmit side scaling (TSS)
 - Interrupt coalescing
- Virtualization
 - VMware NetQueue support
 - Microsoft Hyper-V VMQ support (up to 208 dynamic queues)
 - Linux Multiqueue support
 - PCI SIG SR-IOV compliant with support for 192 Virtual Functions
 - Virtual NIC (vNIC) / Network Partitioning (NPAR) with support for up to 16 physical functions
 - Unified Fabric Protocol (UFP) with support for up to 16 physical functions
 - VXLAN-aware stateless offloads
 - NVGRE-aware stateless offloads
 - Geneve-aware stateless offloads
 - IP-in-IP-aware stateless offloads
 - GRE-aware stateless offloads
 - Stateless Transport Tunneling
 - Edge Virtual Bridging (EVB)
 - Per Virtual Function (VF) statistics
 - VF Receive-Side Scaling (RSS)/Transmit-Side Scaling (TSS)
- RDMA over Converged Ethernet (RoCE)
 - RoCEv1
 - RoCEv2
 - iSCSI Extensions for RDMA (iSER)
 - Internet wide area RDMA protocol (iWARP)
 - Storage over RDMA: iSER, SMB Direct, and NVMe over Fabrics
 - NFSoverRDMA
- Tunneling Offloads:
 - Virtual Extensible LAN (VXLAN)
 - Generic Network Virtualization Encapsulation (GENEVE)
 - Network Virtualization using Generic Routing Encapsulation (NVGRE)
 - Linux Generic Routing Encapsulation (GRE)
- Data Center Bridging (DCB)
 - Priority-based flow control (PFC; IEEE 802.1Qbb)
 - Enhanced transmission selection (ETS; IEEE 802.1Qaz)
 - Quantized Congestion Notification (QCN; IEEE 802.1Qau)
 - Data Center Bridging Capability eXchange (DCBX; IEEE 802.1Qaz)
- Manageability
 - QLogic Control Suite integrated network adapter management utility (CLI) for Linux and Windows
 - QConvergeConsole integrated network management utility (GUI) for Linux and Windows
 - QConvergeConsole Plug-ins for vSphere (GUI) and ESXCLI plug-in for VMware
 - QConvergeConsole PowerKit (Windows PowerShell) cmdlets for Linux and Windows
 - UEFI-based device configuration pages
 - Native OS management tools for networking
 - Full support for Lenovo OneCLI, ASU, XClarity Administrator and firmware updates
 - SNIA HBA API v2 and SMI-S APIs

- Power Saving
 - ACPI compliant power management
 - PCI Express Active State Power Management (ASPM)
 - PCI Express eCLKREQ support
 - PCI Express unused lane powered down
 - Ultra low-power mode
 - Power Management (PM) Offload

IEEE standards

The adapter supports these IEEE specifications:

- 802.1AS (Precise Synchronization)
- 802.1ax-2008 (Link Aggregation) (IEEE 802.3ad)
- 802.1q (VLAN)
- 802.1Qaz (DCBX and ETS)
- 802.1Qbb (Priority-based Flow Control)
- 802.3-2015 (10Gb and 25Gb Ethernet flow Control)
- 802.3-2015 Clause 52 (10Gb Ethernet optical)
- 802.3by-2016 (25G Ethernet)
- 1588-2002 PTPv1 (Precision Time Protocol)
- 1588-2008 PTPv2

The adapter supports these additional specifications:

- SFF8431 Annex E (10Gb Direct Attach Copper)
- IPv4 (RFQ 791)
- IPv6 (RFC 2460)

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 5. ThinkSystem server support (Part 1)

Part number	Description	Intel 2S								AMD			
		ST550 (7X09/7X10)	SR530 (7X07/7X08)	SR550 (7X03/7X04)	SR570 (7Y02/7Y03)	SR590 (7X98/7X99)	SR630 (7X01/7X02)	SR650 (7X05/7X06)	SR670 (7Y36/37/38)	SR635 (7Y98/7Y99)	SR655 (7Y00/7Z01)	SR645 (7D2Y/7D2X)	SR665 (7D2W/7D2V)
4XC7A08264	ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port OCP Ethernet Adapter	N	N	N	N	N	N	N	N	Y	Y	Y	Y
4XC7A08270	ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	N	N	N	N	N	N	N	N	Y	Y	Y	Y

Table 6. ThinkSystem server support (Part 2)

Part number	Description	E	1S Intel				4S Intel				Dense/ Blade			
		SE350 (7Z46/7D1X)	ST50 (7Y48/7Y50)	ST250 (7Y45/7Y46)	SR150 (7Y54)	SR250 (7Y51/7Y52)	SR850 (7X18/7X19)	SR850P (7D2F/2D2G)	SR860 (7X69/7X70)	SR950 (7X11/12/13)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
4XC7A08264	ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port OCP Ethernet Adapter	N	N	N	N	N	N	N	N	N	N	N	N	N
4XC7A08270	ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	N	N	N	N	N	N	N	N	N	N	N	N	N

Operating system support

The following tables list the supported operating systems:

- [ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port OCP Ethernet Adapter, 4XC7A08264](#)
- [ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port PCIe Ethernet Adapter, 4XC7A08270](#)

Tip: These tables are automatically generated based on data from [Lenovo ServerProven](#).

Table 7. Operating system support for ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port OCP Ethernet Adapter, 4XC7A08264

Operating systems	SR635	SR645	SR655	SR665
Microsoft Windows Server 2016	Y	Y	Y	Y
Microsoft Windows Server 2019	Y	Y	Y	Y
Red Hat Enterprise Linux 7.6	N	N	Y	N
Red Hat Enterprise Linux 7.7	N	N	Y	N
Red Hat Enterprise Linux 7.8	N	N	Y	N
Red Hat Enterprise Linux 7.9	Y	N	Y	N
Red Hat Enterprise Linux 8.0	Y	N	Y	N
Red Hat Enterprise Linux 8.1	N	N	Y	N
Red Hat Enterprise Linux 8.2	Y	N	Y	N
SUSE Linux Enterprise Server 12 SP4	N	N	Y	N
SUSE Linux Enterprise Server 12 SP4 with Xen	N	N	Y	N
SUSE Linux Enterprise Server 12 SP5	N	N	Y	N
SUSE Linux Enterprise Server 12 SP5 with Xen	N	N	Y	N
SUSE Linux Enterprise Server 15 SP1	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2	Y	N	Y	N
SUSE Linux Enterprise Server 15 SP2 with Xen	Y	N	Y	N
VMware vSphere Hypervisor (ESXi) 6.5 U3	N	N	Y	N
VMware vSphere Hypervisor (ESXi) 6.7 U3	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U1	Y	N	Y	N

Table 8. Operating system support for ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port PCIe Ethernet Adapter, 4XC7A08270

Operating systems	SR635	SR645	SR655	SR665
Microsoft Windows Server 2016	Y	Y	Y	Y
Microsoft Windows Server 2019	Y	Y	Y	Y
Red Hat Enterprise Linux 7.7	Y	N	Y	N
Red Hat Enterprise Linux 7.8	Y	N	Y	N
Red Hat Enterprise Linux 7.9	Y	N	Y	N
Red Hat Enterprise Linux 8.0	Y	N	Y	N
Red Hat Enterprise Linux 8.1	Y	N	Y	N
Red Hat Enterprise Linux 8.2	Y	N	Y	N
SUSE Linux Enterprise Server 15 SP1	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2	Y	N	Y	N
SUSE Linux Enterprise Server 15 SP2 with Xen	Y	N	Y	N
VMware vSphere Hypervisor (ESXi) 6.7 U3	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U1	Y	N	Y	N

Physical specifications

The Low profile adapters have the following dimensions:

- Length: 167 mm (6.6 in.)
- Height: 69 mm (2.71 in.)

The OCP adapter has the following dimensions:

- Width: 76 mm (3 in.)
- Depth: 115 mm (4.5 in.)

Operating environment

The adapters are supported in the following environment:

- Temperature (operating): 0 to 55 °C (32 to 131 °F)
- Temperature (storage): -40 to 65 °C (-40 to 149 °F)
- Humidity (operating): 10 to 80% non-condensing
- Humidity (storage): 5 to 90% non-condensing

Warranty

One-year limited warranty. When installed in a supported server, the adapter assumes the server's base warranty and any warranty upgrade.

Agency approvals

The adapters conform to the following standards:

- UL 60950-1
- CSA C22.2
- TUV EN60950-1
- TUV IEC 60950-1
- CB Certified
- FCC Rules, CFR Title 47, Part 15, Subpart Class A
- Industry Canada, ICES-003: Class A
- EN55032
- EN55024
- EN61000-3-2
- EN61000-3-3
- VCCI: Class A
- AS/NZS: Class A
- KC-RRA Class A
- BSMI CNS 13438
- RoHS compliant

Related publications

For more information, see the following resources:

- Marvell products for Lenovo:
<https://www.marvell.com/lenovo>
- Networking Options for ThinkSystem Servers
<https://lenovopress.com/lp0765-networking-options-for-thinksystem-servers>
- Lenovo ServerProven compatibility information:
<http://www.lenovo.com/us/en/serverproven/>
- Support page for the adapter:
<https://datacentersupport.lenovo.com/us/en/search?query=4XC7A08228>

Related product families

Product families related to this document are the following:

- [25 Gb Ethernet Connectivity](#)
- [Ethernet Adapters](#)

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This document, LP1189, was created or updated on September 8, 2020.

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