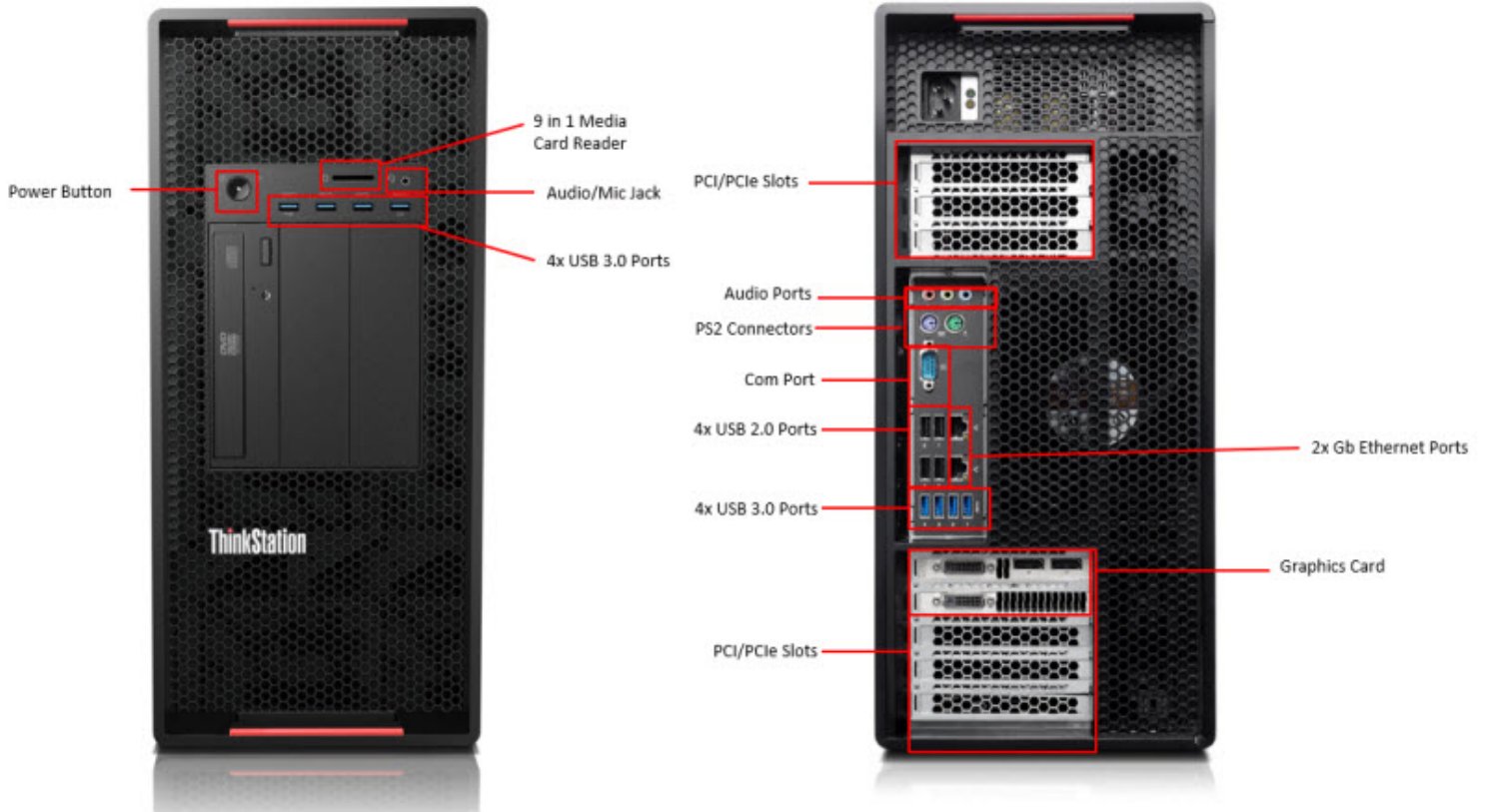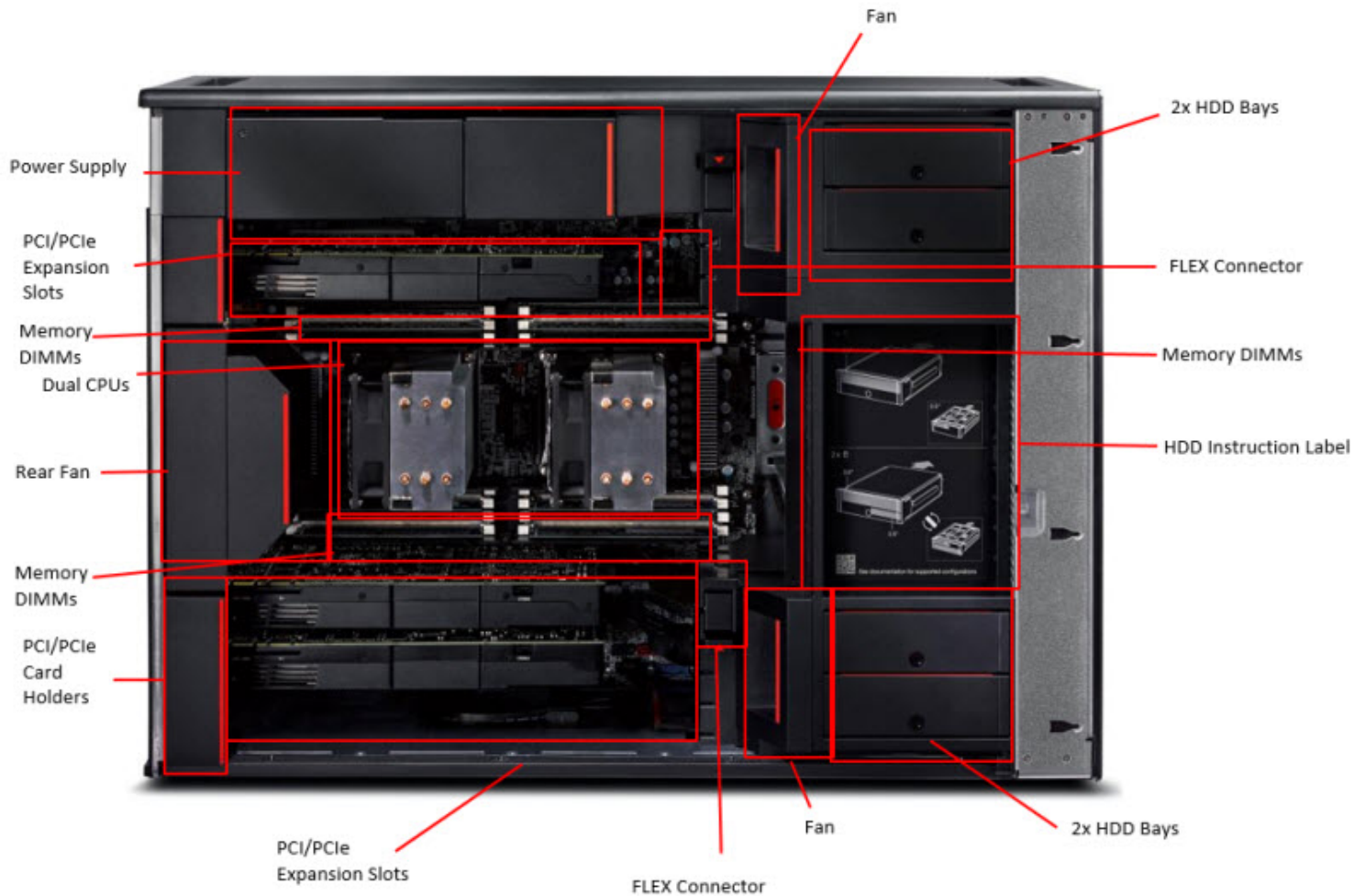PDF   Version: 1.4, Sept 24, 2015

THINKSTATION P900

Product Overview

The ThinkStation P900 is high performance dual socket workstation. An Intel® Grantley-based product, the P900 provides excellent performance and quality for applications where processor, memory, graphics, and storage requirements are critical.

The P900 is positioned above two Grantley-based workstations, the single socket P500 and dual socket P700.

Operating Systems

Preloaded
Genuine Windows 7® Professional 64-bit
Genuine Windows 10® Professional 64-bit
Genuine Windows 10® 64-bit

Supported
Red Hat Enterprise Linux 7

Motherboard – P900

Form Factor

Board Size	13.15" x 14.9" (334mm x 378.5mm)
Layout	Custom ATX

Motherboard Core

Processor Support	Intel® Xeon™ Quad Core (Haswell EP)
	Intel® Xeon™ Six Core (Haswell EP)

Intel® Xeon™ Eight Core (Haswell EP)

Intel® Xeon™ Ten Core (Haswell EP)

Intel® Xeon™ Twelve Core (Haswell EP)

Intel® Xeon™ Fourteen Core (Haswell EP)

Intel® Xeon™ Sixteen Core (Haswell EP)

Intel® Xeon™ Eighteen Core (Haswell EP)

Socket Type	Socket-R3 (LGA 2011)
Memory Support	1333/1600/1866/2133 MHz
QPI (GTPS)	6.4/8.0/9.6 GTPS Links
Voltage Regulator	Intel VR12.5 – 145W TDP Capable
Chipset (PCH)	Wellsburg (Intel 612)
Flash	16MB + Depoped 16MB
HW Monitor	
Super I/O	Nuvoton NCT6683D
Clock	Wellsburg (Intel 612) Native isCLK
Audio	Realtek ALC662
Ethernet	Intel Clarkville WGI218LM
SAS	Optional via Flex Adapter

Memory

Slots	16 total Slots, 8 per CPU
Channels	4 Channels per CPU
Type	DDR4 288-Pin, 1333/1600/1866/2133 MHz ECC UDIMM, RDIMM, and LRDIMM support
ECC Support	YES
Speed	Up to 2133 MHz
Max DIMM Size	Up to 32GB RDIMM, 64GB LRDIMM
Max System Memory	Up to 1TB LRDIMM (w/ 64GB)

Ethernet

Vendor	Intel
Count	2
EEPROM	None for Clarkville
Speeds	10/100/1000 Mbps
Functions	PXE, ASF, WOL, Jumbo Frames, Teaming
Connectors	(2) x RJ45 on Rear I/O

Audio

Vendor	Realtek
Type	HD (5.1)
Internal Speaker	Yes, using SSM2211 amplifier
Connectors	(3) x Rear 3.5mm Jacks (Line In, Line Out, Microphone In)
	Global Headphone Jack (Headphone + MIC in

(1) x 2-Pin Internal Speaker Header

Video

Onboard	<Not Supported>
Adapter	(3) x PCI-E 3.0 16-Lane Slots
	Additional adapters may be supported in x4 slots for Spec Bids
Multi-GPU Support	BIOS supported, card dependent

Storage

Floppy	None
IDE	None
SATA/SAS	(8) x SATA Connectors, Gen. 3
	4 SATA HDD ports connected through 2 Mini SAS HD (X2 electrical, X4 mechanical) (2 HDDs upper bay, 2HDDs lower bay) + 2 SATA Gen 3 for ODDs + 1SATA for Mez Connector
eSATA	(1) x eSATA Connector, Gen. 3 (Optional eSATA bracket)

Slots

Slot 1 (Near CPU)	PCIe x16, gen 3, full length, full height
Slot 2	PCIe x1, gen 2, full length, full height, open ended ("Half length with Flex Adapters / Full length without Flex Adapter")
Slot 3	PCIe x16, gen 3, full length, full height
Slot 4	PCIe x1, gen 2, full length, full height, open ended
Slot 5	PCIe x4, gen 2, half length, full height, open ended
Slot 6 (Near Edge)	PCIe x16, gen 3, full length, full height ("Half length with Flex Adapters / Full length without Flex Adapter")
Slot 7	PCIe x16, gen 3, full length, full height
Slot 8	PCIe x4, gen 2, full length, full height, open ended

Rear I/O

COM	(1) x Serial Port (COM1)
eSATA	(1) x eSATA Port (Gen. 2), optional via bracket
LPT	None
Video	<No Onboard Video>
Audio	Microphone-In, Line In, Line Out
Ethernet	(2) x RJ45
USB 2.0	(4) x USB 2.0 Ports
USB 3.0	(4) x USB 3.0 Ports
Firewire	Optional

Internal I/O

USB 2.0	6 Total (4 Rear, 2 Internal to Flex Slot)
USB 3.0	9 total (4 front, 4 rear, 1 internal header for MCR)
PS/2	Yes (2)
Audio	2×7-pin (Mic In, Headphone) Global Version
COM2	None

Clear CMOS	3-Pin Clear CMOS Header
Speaker	2-Pin Internal Speaker Header
Chassis Intrusion	2-Pin Chassis Intrusion Switch Header
Firewire	None

Thermal

Temp Sensors	Ambient Thermal Sensor – Thermal diode Connected to Super I/O
	VR1 Thermal Sensor – Thermal diode Connected to Super I/O
	VR2 Thermal Sensor- Thermal diode Connected to Super I/O
	PSU Thermal Sensor
Fans	CPU Fan 4-pin header with 3-pin key
	Rear SYSTEM Fan X2 4-pin header with 4-pin key
	Front Fan 4-pin header with 4 pin key
	ODD bay Fan X2 4-pin header with 3-pin key
	PSU Fan Main PSU power connector

Power Connectors

Main	Single Card Edge Connector
Memory & CPU	
Graphics	

Security

TPM	Version 1.2, Infineon SLB9660TT1.3
Asset ID	Yes, 1024X8bit, might depoped in future
vPro	Intel vPro for WS (AMT 9.x)

BIOS

Vendor	AMI

Chassis Summary
Chassis Information

Format	55L Rack Mountable Tower
Dimensions	440mm H x 200mm W x 620mm D (chassis only)446mm H x 200mm W x 620mm D (with rear handle & feet)
Weight	71.3lbs
Color	
PSU	1300W 92% Efficient tooless
Thermal Solutions	Three (3) system fans standard (2 front, 1 rear)

Physical Security & Serviceability

Access Panel	Tool-less side cover removal
Optical Drive	Tool-less
Hard Drives	Tool-less
Expansion Cards	Tool-less
Processor Socket	Tool-less

Color coded User Touch Points	Yes
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Tool-less
Green Color Power LED on Front of Computer	Yes
Restore CD/DVD Set	Restore system to original factory shipping image – Can be obtained via Lenovo Support
Cable Lock Support	Yes, Optional Kensington Cable Lock
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Yes
Power-On Password	Yes
Setup Password	Yes
NIC LEDs (integrated)	Yes
Security Chip	Yes
Access Panel Key Lock	Optional
Boot Sequence Control	Yes
Padlock Support	Yes, loop in rear for optional padlock, prevents side panel removal
Boot without keyboard and/or mouse	Yes

Operating Environment
Air Temperature
- Operating: 10°C to 35°C (50°F to 95°F)
- Storage: -40°C to 60°C (-40°F to 140°F) in original shipping carton
- Storage: -10°C to 60°C (14°F to 140°F) without carton

Humidity
- Relative Humidity Operating: 10% to 80% (non-condensing)
- Relative Humidity Storage/Transit: 10% to 90% (non-condensing)
- Wet Bulb Temperature Operating: 25°C max
- Wet Bulb Temperature Non-operating: 40°C max

Altitude
- Operating: -15.2 m to 3048 m (-50 ft to 10 000 ft)

Regulations and Standards
EMC
- FCC (DoC)/Canada
- CE (EMC)
- VCCI
- JEIDA
- C-Tick
- BSMI
- CCIB

Safety
- FCC (DoC)/Canada
- CE (EMC)
- VCCI

- JEIDA
- C-Tick
- BSMI
- CCIB
- PSB
- CE (LVD)

Environmentals

Energy Star
- Energy Star Program Requirements for Computers: Version 6.0 (select models)

EPEAT
- EPEAT™ Gold rating (select models)

EuP Lot-6 2012
- EuP Lot-6 2012 (Enabled via system setup. Default on for systems shipped to EMEA.)

Hazardous Substances
- Products do not contain more than; 0.1% lead, 0.01% cadmium, 0.1% mercury, 0.1% hexavalent chromium, 0.1% polybrominated biphenyls (PBB) or 0.1% polybrominated diphenol ethers (PBDE).
- Products do not contain Asbestos.
- Products do not contain Ozone Depleting Substances: Chlorofluorocarbons (CFC), hydrobromofluorocarbons (HBFC), hydrochlorofluorcarbons (HCFC), Halons, carbontetrachloride, 1,1,1-trichloroethane, methyl bromide
- Products do not contain more than; 0.005% polychlorinated biphenyl (PCB), 0.005% polychlorinated terphenyl (PCT) in preparation.
- Products do not contain more than 0.1% short chain chloroparaffins (SCCP) with 10-13 carbon atoms in the chain containing at least 48% per mass of chlorine in the SCCP
- Parts with direct and prolonged skin contact do not release nickel in concentrations above 0.5 microgram/cm^2/week.

SECTION II: SUPPORTED COMPONENTS

CPU Specifications

2S Processor SKUs – These SKUs have 2 QPI links and are targeted for dual CPU systems but will also work on single CPU systems

Intel Xeon E5-2687W v3 – 10 Cores, 3,1GHz, 9.6 QPI, 25MB Cache, DDR4-2133, Turbo. HT, 160W

Intel Xeon E5-2699 v3 – 18 Cores, 2.3GHz, 9.6 QPI, 45MB Cache, DDR4-2133, Turbo, HT, 145W

Intel Xeon E5-2698 v3 – 16 Cores, 2.3GHz, 9.6 QPI, 40MB Cache, DDR4-2133, Turbo, HT, 135W

Intel Xeon E5-2697 v3 – 14 Cores, 2.6GHz, 9.6 QPI, 35MB Cache, DDR4-2133, Turbo, HT, 145W

Intel Xeon E5-2695 V3 – 14 Cores, 2.3GHz, 9.6 QPI, 35MB Cache, DDR4-2133, Turbo, HT, 120W

Intel Xeon E5-2690 v3 – 12 Cores, 2.6GHz, 9.6 QPI, 30MB Cache, DDR4-2133, Turbo, HT, 135W

Intel Xeon E5-2685 v3 – 12 Cores, 2.6GHz, 9.6 QPI, 30MB Cache, DDR4-2133, Turbo, 120W

Intel Xeon E5-2683 v3 – 14 Cores , 2.0GHz, 9.6 QPI, 35MB Cache, DDR4-2133,Turbo, HT, 120W

Intel Xeon E5-2680 v3 – 12 Cores, 2.5GHz, 9.6 QPI, 30MB Cache, DDR4-2133, Turbo, HT, 120W

Intel Xeon E5-2670 v3 – 12 Cores, 2.3GHz, 9.6 QPI, 30MB Cache, DDR4-2133,Turbo, HT, 120W

Intel Xeon E5-2667 v3, EP2S – 8 Cores, 3.2 GHz, 9.6 QPI, 20MB Cache, DDR4-2133, Turbo, HT, 135W

Intel Xeon E5-2660 v3 – 10 Cores, 2.6GHz, 9.6 QPI, 25MB Cache, DDR4-2133, Turbo, HT, 105W

Intel Xeon E5-2650 v3 – 10 Cores, 2.3GHz, 9.6 QPI, 25MB Cache, DDR4-2133, Turbo, HT, 105W

Intel Xeon E5-2643 v3 – 6 Cores, 3.4GHz, 9.6 QPI, 20MB Cache, DDR4-2133 , Turbo, HT, 135W

Intel Xeon E5-2640 v3 – 8 Cores, 2.6GHz, 8.0 QPI, 20MB Cache, DDR4-1866, Turbo, HT, 90W

Intel Xeon E5-2637 v3 – 4 Cores, 3.5GHz, 9.6 QPI, 15MB Cache, DDR4-2133, Turbo, HT, 135W

Intel Xeon E5-2630 v3 – 8 Cores, 2.4GHz, 8.0 QPI, 20MB Cache, DDR4-1866, Turbo, HT, 85W

Intel Xeon E5-2623 v3 – 4 Cores, 3.0GHz, 8.0 QPI, 10MB Cache, DDR4-1866, Turbo, HT, 105W

Intel Xeon E5-2620 v3 6 Cores, 2.4GHz, 8.0 QPI, 15MB Cache, DDR4-1866, Turbo, HT, 85W

Intel Xeon E5-2609 v3 – 6 Cores, 1.9GHz, 6.4 QPI, 15MB Cache, DDR4-1600, 85W

Intel Xeon E5-2603 v3 – 6 Cores, 1.6GHz, 6.4 QPI, 15MB Cache, DDR4-1600, 85W

Intel Xeon E5-2650L v3 – 12 Cores, 1.8GHz, 9.6 QPI, 30MB Cache, DDR4-2133, Turbo, HT, 65W

Intel Xeon E5-2630L v3 – 8 Cores, 1.8GHZ, 8.0 QPI, 20MB Cache, DDR4-1866, Turbo, HT, 55W

1S Processor SKUs – These SKUs have 1 QPI link and are targeted for single CPU systems. If these are to be used in a dual processor system, only one 1S CPU can be installed and the CPU2 memory slots will not be functional.

Intel Xeon E5-1680 v3 – 8 Cores,3.2 GHz, 20MB Cache, DDR4-2133, Turbo, HT, 140W

Intel Xeon E5-1660 v3 – 8 Cores, 3.0 GHz, 20MB Cache, DDR4-2133, Turbo, HT, 140W

Intel Xeon E5-1650 v3 – 6 Cores,3.5 GHz, 15MB Cache, DDR4-2133, Turbo, HT, 140W

Intel Xeon E5-1630 v3 – 4 Cores, 3.7 GHz, 10MB Cache, DDR4-2133, Turbo, HT,140W

Intel Xeon E5-1620 v3 – 4 Cores, 3.5 GHz, 10 MB Cache, DDR4-2133, Turbo, HT, 140W

Intel Xeon E5-1607 v3 – 4 Cores, 3.1 GHz,10 MBCache, DDR4-1866, 140W

Intel Xeon E5-1603 v3 – 4 Cores, 2.8 GHz, 10 MB Cache, DDR4-1866, 140W

Notes

When ordering two processors, the second processor must be the same as the first. Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families.

Multi core technologies are designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefits; check with software provider to determine suitability; not all customers or software applications will necessarily benefit from use of these technologies.

64-bit computing on Intel® 64 architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel® 64 architecture. Processors will not operate (including 32-bit operation) without an Intel® 64 architecture-enabled BIOS. Performance will vary depending on your hardware and software configurations

Memory Specifications
P900

RDIMMs – 2133MHz

4GB DDR4 ECC RDIMM PC4-2133-R

8GB DDR4 ECC RDIMM PC4-2133-R 1Rx4 4Gbit

16GB DDR4 ECC RDIMM PC4-2133-R 2Rx4 4Gbit

32GB DDR4 ECC RDIMM PC4-2133-R 2Rx4 8Gbit

LRDIMMs – 2133MHz

32GB DDR4 ECC LRDIMM PC4-2133-L 4Rx4 4Gbit

64GB DDR4 ECC LRDIMM PC4-2133-L

Storage – Hard Drive/SSD Specifications

3.5″ SATA Hard Disk Drive (HDD)

500GB SATA – 7200rpm, 6Gb/s, 3.5″

1TB SATA – 7200rpm, 6Gb/s, 3.5″

2TB SATA – 7200rpm, 6Gb/s, 3.5″

3TB SATA – 7200rpm, 6Gb/s, 3.5″

3.5″ Enterprise SATA Hard Disk Drive (HDD)

4TB SATA – 7200rpm, 6Gb/s, 3.5″

3.5″ Hybrid Drive

1TB SATA – 7200rpm, 6Gb/s, 3.5″ Hybrid

2TB SATA – 7200rpm, 6Gb/s, 3.5″ Hybrid

2.5″ SAS Hard Disk Drive (HDD)

 300GB SAS – 15000rpm, 12Gb/s, 2.5″

450GB SAS – 15000rpm, 12Gb/s, 2.5″

600GB SAS – 15000rpm, 12Gb/s, 2.5″

2.5″ SAS Solid State Drive (SSD)

200GB SAS SSD – 12Gb/s, 2.5″

400GB SAS SSD – 12Gb/s, 2.5″

800GB SAS SSD – 12Gb/s, 2.5″

2.5″ SATA Solid State Drive (SSD)

128GB SATA SSD, 6Gb/s, 2.5″ Non-OPAL

180GB SATA SSD. 6Gb/s. OPAL.2.5″

240GB SATA SSD, 6Gb/s,OPAL. 2.5″

256GB SATA SSD, 6Gb/s, 2.5″ OPAL

256GB SATA SSD, 6Gb/s, 2.5″ Non-OPAL

480GB SATA SSD, 6Gb/s,OPAL. 2.5″

512GB SATA SSD, 6Gb/s, 2.5″ Non-OPAL

1 TB SATA SSD , 6Gb/s, 2.5″ Non-OPAL

M.2 (NGFF) PCIe Solid State Drive (SSD)

256 GB M.2 PCIe – Solid State Drive (SSD), Gen2x4

256 GB M.2 PCIe – Solid State Drive (SSD), Gen3x4

512 GB M.2 PCIe – Solid State Drive (SSD), Gen3x4

256 GB M.2 PCIe NVMe- Solid State Drive (SSD), Gen3x4

512 GB M.2 PCIe NVMe- Solid State Drive (SSD), Gen3x4

PCIe Half Height / Half Length Solid State Drive (SSD)

410GB PCIe – FusionIO ioFX-2 410GB HHHL PCIe SSD, Gen2, x4 electrical x4
physical

1.6TB PCIe – FusionIO ioFX-2 1.6TB HHHL PCIe SSD, Gen2, x4 electrical x4
physical

RAID

Supported RAID levels for a system will vary from the stated capabilities of the RAID
controller due to dependencies on the number and capacity of physical disks in the system

and on customer requirements for performance, fault tolerance, or data redundancy. Max support RAID 0,1,5,10

RAID levels and requirements:

- RAID 0 (striping) provides increased performance by writing data across multiple drives.
- RAID 1 (mirroring) provides fault tolerance by writing the data on two drives.
- RAID 5 (striping with parity) uses distributed parity data to provide fault tolerance more efficiently than RAID 1. Requires three or more drives.
- RAID 10 (or RAID 1+0) combines
- RAID 1 and RAID 0 to create a stripe of mirrors that is fault tolerant while offering increased performance. Requires four drives.

Optional Hard Disk Drive Controllers

- LSI 9364-8i 8-port SATA/SAS ROC Adapter(Base Mode) w/ 1GB DDR Memory Module
- LSI 9364-8i 8-port SATA/SAS ROC Adapter(Protected Mode) w/ 1GB Flash Memory Module+SuperCap
- LSI SAS/SATA RAID Flex adapter

Optical Drive/Removable Media

DVD-ROM Drive (SATA)

DVD-ROM Drive – 16x/48x (SATA)

DVD Burner/CD-RW Rambo Drive (SATA)

DVD Burner/CD-RW Rambo Drive (SATA)

Blu-Ray Burner Drive (SATA)

Blu-Ray Burner Drive w/AACS encryption (SATA)

DVD Burner/CD-RW Rambo Drive (Slim SATA)

DVD Burner/CD-RW Rambo Drive (9.5mm Slim SATA)

Media Card Reader

Front 9 in 1 Media Card reader Standard

Front 29 in 1 Media card reader, USB3.0, MPOB, 760mm (Requires FLEX Module)

Keyboard

- Preferred Pro Fullsize Keyboard (USB)
- Preferred Pro Fullsize Keyboard (PS/2)

Pointing Devices

- Optical Wheel Mouse (1000 DPI), USB – red wheel

Graphics Cards

Nvidia NVS310 (DP x 2) – 1GB DDR3

Nvidia NVS315 (with DMS-59 to Dual DVI single link dongle) – 1GB GDDR5

Nvidia NVS315 (with DMS-59 to Dual Display Port dongle) – 1GB GDDR5

Nvidia NVS 510 (mini DP x 4) – 2GB DDR5

NVQuadro K420(DP/DVI)-2GB DDR3- ATX

Nvidia Quadro K620 (DVI, DP) – 2GB DDR3 ATX

Nvidia Quadro K2200 (DVI, DP, DP) – 4GB DDR5 ATX

Nvidia Quadro K4200 (2xDP+DVI) – 4GB DDR5 ATX-Long Offset Ext Bracket

Nvidia Quadro M4000 (DP x 4l) – 8GB GDDR5- ATX Long Offset Ext Bracket

Nvidia Quadro K5200 (DVI x 2, DP, DP) – 8GB DDR5 – Long Offset Ext Bracket, ATX Lext

Nvidia Quadro M5000 (DVI, DP x 4) – 8GB GDDR5- ATX Long Offset Ext Bracket

Nvidia Quadro K6000 (Dual link DVI x 2, DP, DP) – 12GB GDDR5 – Long Offset Ext Bracket, 2*6-pin Pwr

Nvidia Quadro M6000 (DP x 4, DVI) – 12GB GDDR5 – Long Offset Ext Bracket, 8-pin Pwr

NVIDIA SLI Implementations

2 x Nvidia Quadro K5200 with SLI cable

2 x Nvidia Quadro K6000 with SLI Cable

NVIDIA GPU Computing Processor

Nvidia Tesla K20 – 5GB GDDR5 – Long Offset Ext Bracket

NVIDIA Tesla K40 GPU Active Accelerator – 12GB GDDR5 Long Ext

NVIDIA Stereo 3D Bracket

Nvidia Stereo 3D Connector Bracket

FLEX Components

Flex Bay: Formerly known as ODD bays. Will support not only ODD, but
also HDDs and Flex Module

Flex Module: Module supported in the Flex Bay with several options
integrated. Will support slim ODD, High Speed Media Card Reader or 2
universal ports supporting IEEE1394, eSATA, etc…

Flex Connector: Mezzanine connector in the motherboard, that enables
expanded storage and I/O. 2 available in P900, 1 available in P500/P700

Flex Tray: New HDD Tray design enables that two drives on a single tray
(when used in a blind connect configuration)

PCIe

Network	Intel 82574L Gigabit CT2 Desktop Ethernet Adapter
	Intel 1 Gigabit ET Dual Port Server Adapter
Thunderbolt	
IEE 1394	IEEE 1394a (Firewire-400) PCI Express x1 Adapter (1 external, 1 internal port)
USB	USB 3.0 PCI Express x1 Adapter
Audio Devices	Lenovo Branded 2-Piece Speaker Set
	Speaker Brick

SECTION III: SYSTEM TECHNICAL SPECIFICATIONS

Power Supply Specifications

Power Supply	1300W PSU
Operating Voltage Range	90-264VAC
Rated Voltage Range	100-240V
	50/60Hz
Rated Line Frequency	47Hz/63Hz
Operating Line Frequency Range	15A-9A
Rated Input Current	
	(2) 60x38mm, 14000rpm max
Power Supply Fan	

ENERGY STAR® qualified (Config Dependent)	*System level select models
80 PLUS Compliant	Yes 80 PLUS Platinum
Built-in Self Test (BIST) LED	YES
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	YES
Aux Power Drop	Quad Drop

Click here to access the ThinkStation Power Calculator.

BIOS Specifications

WMI Support	Compliant with Microsoft WBEM and the DMTF Common Information Model
ROM-Based Setup Utility (F1)	System Configuration Setup program available at power-on with F1 key
Bootblock Recovery	Recovers system BIOS when Flash ROM corrupted.
Replicated Setup	Saves System Configuration settings to file that can then be used replicated to other systems.
Boot Control	Boot control available through ROM-Based Setup Utility or with F12 key at power-on
Memory Change Alert	Power-on Error message in event of decrease in system memory
Thermal Alert	Power-on Error message in event of fan failure
Asset Tag	Support ability to set SMBIOS Type 2 Baseboard Asset Tag field.
System/Emergency ROM Flash Recovery with Video	Support process to recover system BIOS when Flash ROM corrupted
Remote Wakeup/Remote Shutdown	System admin can power on/off a client computer from remote location to provide maintenance
Quick Resume time	Support lor power S3 (suspend to RAM) and prompt resume times
ROM revision level	System UEFI (BIOS) version reported in SMBIOS Type 0 structure and in BIOS Setup
Keyboard-less Operation	System can be booted without a keyboard
Per-port Control	Allows I/O ports to be individually enabled/disabled through ROM-based setup or WMI interface
Adaptive Cooling	Fans dynamically controlled by system BIOS based on temperature. User has ability to provide custom fan control table
Security	User and Administrator passwords can protect boot and ROM-base Setup. Chassis intrusion detection protect
Intel(R) AMT (includes ASF 2.0)	Allows system to be supported from a remote location
Intel(R) TXT	Intel(R) Trusted Execution Technology provides a security foundation to build protections against software base attacks.
Memory modes	Supports mirroring, lock step, and sparing memory modes
Windows 8 ready	Supports Windows 8 requirements – Secure flash, UEFI v 2.3.1 spec

Industry Standard Specification
Support

UEFI	Unified Extensible Firmware Interface v2.3.1d
ACPI (Advanced Configuration and power Management Interface)	Advanced Configuration and Power Interface v5.0
ASF 2.0	DMTF Alert Standard Format Specification v2.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6)
CD Boot	"El Torito" Bootable CD-Rom Format Specification, Version 1.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	PCI Local Bus v3.0
	PC Firmware Specification 3.1
PCI Express	PCI Express Base Specification 3.0
SATA	Serial ATA Revision 3.0 Specification
TPM	Trusted Computing Group TPM Specification Version 1.2
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB	Universal Serial Bus Revision 1.1
	Universal Serial Bus v2.0
	Universal Serial Bus v3.0
SMBIOS	DMTF System Management Spec v2.8.0

Social and Environmental Responsibility

Quality Control

- Lenovo is a member of an eco declaration system that enforces regular independent quality control

Hazardous substances and preparation

- Products do not contain more than; 0.1% lead, 0.01% cadmium, 0.1% mercury, 0.1% hexavalent chromium, 0.1% polybrominated biphenyls (PBB) or 0.1% polybrominated diphenyl ethers (PBDE). (See legal reference and Note B2
- Products do not contain Asbestos
- Products do not contain Ozone Depleting Substances: Chlorofluorocarbons (CFC), hydrobromofluorocarbons (HBFC), hydrochlorofluorcarbons (HCFC), Halons, carbontetrachloride, 1,1,1-trichloroethane, methyl bromide
- Products do not contain more than; 0.005% polychlorinated biphenyl (PCB), 0.005% polychlorinated terphenyl (PCT) in preparation
- Products do not contain more than 0.1% short chain chloroparaffins (SCCP) with 10-13 carbon atoms in the chain containing at least 48% per mass of chlorine in the SCCP
- Parts with direct and prolonged skin contact do not release nickel in concentrations above 0.6 microgram/cm^2/week
- REACH Article 33 information about substances in articles is available at: http://www.lenovo.com/social_responsibility/us/en/ThinkGreen_products.html#environment

Batteries

- If the product contains a battery or an accumulator, it is labeled with the disposal symbol and if it contains more than 0.0005% of mercury (for button cells only) by weight, or more than 0.004% of lead,it shall be marked with the chemical symbol for the metal concerned, Hg or Pb. Information on proper disposal is provided in user manual

- Button cells used in the product do not contain more than 2% by weight of mercury. Other batteries or accumulators do not contain more than 0.0005% of mercury or 0.002% of cadmium

- Batteries and accumulators are easily removable by either users or service providers (as dependent on the design of the product). Exception: Batteries that are permanently installed for safety, performance, medical or data integrity reasons do not have to be "easily removable

Safety, EMC connection to the telephone network and labeling

- The product complies with legally required safety standards as specified

- The product complies with legally required standards for electromagnetic compatibility

- If product is intended for connection to a public telecom network or contains a radio transmitter, it complies with legally required standards for radio and telecommunication devices

- The product is labeled to show conformance with applicable legal requirements

Product packaging

- Packaging and packaging components do not contain more than 0.01% lead, mercury, cadmium and hexavalent chromium by weight of these together.

- Plastic packaging material is marked according to ISO 11469 referring ISO 1043

- The product packaging material is free from ozone depleting substances as specified in the Montreal Protocol

For more information on Lenovo social environmental practices visit:
http://www.lenovo.com/social_responsibility/us/en/ThinkGreen_products.html#environment

Manageability

Industry Standard Specifications	This product meets the following industry standard specifications for manageability functionality: Intel LAN with AMT
Remote Manageability Software Solutions	Lenovo ThinkStation is supported on the following remote manageability software consoles: Lenovo ThinkManagement Console LANDesk Management Suite for ThinkVantage Technologies (www.landesk.com/lenovo) Microsoft System Center Configuration Manager
System Software Manager	Lenovo ThinkStation supports software management tools from the ThinkVantage System Update suite: System Update Update Retriever Thin Installer
Service, Support, and Warranty	On-site Warranty and Service: Three-years, limited warranty and service offering delivers on-site, next business-day service for parts and labor and includes free telephone support 8am – 5pm. Global coverage ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.

Go to www.lenovo.com/support and www.lenovo.com/warranty for more details

SECTION IV: COMPONENT SPECIFICATIONS

HDD Specifications

2.5″ SAS Hard Disk Drive (HDD)

300GB SAS – 15000rpm, 12Gb/s, 2.5″

450GB SAS – 15000rpm, 12Gb/s, 2.5″

600GB SAS – 15000rpm, 12Gb/s, 2.5″

3.5″ SATA Hard Disk Drive (HDD)

500GB SATA – 7200rpm, 6Gb/s, 3.5″

1TB SATA – 7200rpm, 6Gb/s, 3.5″

2TB SATA – 7200rpm, 6Gb/s, 3.5″

3TB SATA – 7200rpm, 6Gb/s, 3.5″

4TB SATA – 7200rpm, 6Gb/s, 3.5″

3.5″ Hybrid Drive

1TB SATA – 7200rpm, 6Gb/s, 3.5″ Hybrid

2TB SATA – 7200rpm, 6Gb/s, 3.5″ Hybrid

	2.5″ 15K	3.5″ 7200	3.5″ Hybrid
Connector	SAS SFF-8482	SATA	SATA
Transfer Rate (Gb/sec)	12Gb	600MB/sec	600MB/sec
Performance			
Spindle Speed(RPM)	15,000 +/-	7200	7200
Power off to Spindle Stop(sec)	30 max	11 max	11 max
DC Power to Drive Ready(sec)	30 max	17 max	<1
Receipt of Start Unit Command to Drive Ready(sec)	30 max	17 max	<1
Average Latency(msec)	2 +/- 0.25	4.16	4.16
Power Management			
Input(VDC)	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%
Typical(Watts)	TBD	8 max	6.7 max
Idle(Watts)	TBD	0.75	0.75
Dimensions			
Height(mm – Max)	26.11	26.11	26.11
Width(mm)	101.6 +/- 0.25	101.6	101.6
Depth(mm – Max)	146.99	146.99	146.99
Weight(grams)	800 max	626 max	535 max
Temprature			
Operating(C) Ambient	5 to 55	0 to 60	0 to 60
Operating(C) Base Casting	60 max		
Non-Operating(C) Ambient	-40 to 70	-40 to 70	-40 to 70
Gradient(C per Hour)	20 max	30 max	30 max
Shock			

Operating(Gs @ 2ms)	60 max	80 max	80 max
Non-Operating(Gs @ 2ms)	250 max	350 max	350 max

SSD Specifications

2.5″ SAS Solid State Drive (SSD)

200GB SAS SSD – 12Gb/s, 2.5″

400GB SAS SSD – 12Gb/s, 2.5″

800GB SAS SSD – 12Gb/s, 2.5″

2.5″ SATA Solid State Drive (SSD)

128GB SATA SSD, 6Gb/s, 2.5″ Non-OPAL

180GB SATA SSD. 6Gb/s. OPAL.2.5″

240GB SATA SSD, 6Gb/s,OPAL. 2.5″

256GB SATA SSD, 6Gb/s, 2.5″ OPAL

256GB SATA SSD, 6Gb/s, 2.5″ Non-OPAL

480GB SATA SSD, 6Gb/s,OPAL. 2.5″

512GB SATA SSD, 6Gb/s, 2.5″ Non-OPAL

1 TB SATA SSD , 6Gb/s, 2.5″ Non-OPAL

M.2 (NGFF) PCIe Solid State Drive (SSD)

256 GB M.2 PCIe – Solid State Drive (SSD), Gen2x4

256 GB M.2 PCIe – Solid State Drive (SSD), Gen3x4

512 GB M.2 PCIe – Solid State Drive (SSD), Gen3x4

256 GB M.2 PCIe NVMe- Solid State Drive (SSD), Gen3x4

512 GB M.2 PCIe NVMe- Solid State Drive (SSD), Gen3x4

	180GB SATA SSD. 6Gb/s. OPAL.2.5"	240GB SATA SSD, 6Gb/s,OPAL. 2.5"	480GB SATA SSD, 6Gb/s,OPAL. 2.5"	128GB SATA SSD, 6Gb/s, 2.5" Non-OPAL	256GB SATA SSD, 6Gb/s, 2.5" OPAL	256GB SATA SSD, 6Gb/s, 2.5" Non-OPAL	512GB SATA SSD, 6Gb/s, 2.5" Non-OPAL	1 TB SATA SSD , 6Gb/s, 2.5" Non-OPAL
Min Sequential Read	540 MB/s	540 MB/s	540 MB/s	510 MB/s	520 MB/s	520 MB/s	520 MB/s	560 MB/s
MIn Sequential Write	490 MB/s	490 MB/s	490 MB/s	300 MB/s	280 MB/s	280 MB/s	460 MB/s	510 MB/s
Min Random Read (8GB Span)	48000 IOPS	48000 IOPS	48000 IOPS	85000 IOPS	90000 IOPS	90000 IOPS	96000 IOPS	100,000 IOPS
Min Random Write (8GB Span)	80000 IOPS	80000 IOPS	80000 IOPS	65000 IOPS	80000 IOPS	80000 IOPS	80000 IOPS	88,000 IOPS
Min Power – Active	165 mW	165 mW	165 mW	120 mW	120 mW	120 mW	120 mW	150 mW
Min Power – Idle	55 mW	55 mW	55 mW	80 mW	50 mW	50 mW	50 mW	70 mW
Min MTBF	1.2 M hours	1.2 M hours	1.2 M hours	1.5 M hours	1.5M hours	1.5M hours	1.5M hours	1.5M hours
Hardware Encryption	AES 256 bit	AES 256 bit	AES 256 bit	AES 256 bit	AES 256 bit	AES 256 bit	AES 256 bit	AES 256 bit
Lithography	16 nm	16 nm	16 nm					

Interface		PCIe Gen2 x4 ACHI	PCIe Gen3 x4 ACHI	PCIe Gen3 x4 ACHI	PCIe Gen3 x4 NVMe	PCIe Gen3 x4 NVMe
Capacity		256GB	256GB	512GB	256GB	512GB
Performance	Sequential Read	1,200 MB/s	2,250 MB/s	2,250 MB/s	2,250 MB/s	2,600 MB/s
	Sequential Write	1,000 MB/s	1,250 MB/s	1,550 MB/s	1,250 MB/s	1,500 MB/s
	Random Read	105,000 IOPS	150,000 IOPS	150,000 IOPS	295,000 IOPS	310,000 IOPS
	Random Write	75,000 IOPS	95,000 IOPS	100,000 IOPS	93,000 IOPS	100,000 IOPS
Power Consumption		5.4W	6.4W	6.4W	6.5W	5.5W

HDD Controllers

	LSI 9364-8i 8-port SATA/SAS ROC Adapter(Base Mode) w/ 1GB DDR Memory Module	LSI 9364-8i 8-port SATA/SAS ROC Adapter(Protected Mode) w/ 1GB Flash Memory Module+SuperCap
PCI Bus	x8 lane PCI Express® 3.0	x8 lane PCI Express® 3.0
PCI Modes		
RAID Levels	RAID 0, 1, 5, 10, 50 and JBOD mod	RAID 0, 1, 5, 10, 50 and JBOD mod
Data Transfer Rates	Up to 12Gb/s per port	Up to 12Gb/s per port
PCI Card Type		
PCI Voltage	+3.3V, +12V	+3.3V, +12V
PCI Power		
Bracket	Full Height and Low-Profile	Full Height and Low-Profile
Certification Level		
Internal Connectors	2 HD Mini-SAS SFF8643 (Vertical mount)	2 HD Mini-SAS SFF8643 (Vertical mount)

Optical Drives Specifications

	DVD-ROM Drive – 16x/48x (SATA)	DVD Burner/CD-RW Rambo Drive (SATA)
Description	5.25-inch, half-height, tray-load	5.25-inch, half-height, tray-load
Mounting Orientation	Either horizontal or vertical	Either horizontal or vertical
Interface Type	SATA/ATAPI	SATA/ATAPI
Dimensions	(WxHxD) 15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)	(WxHxD) 15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)
Disc Capacity DVD-ROM	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB
Access Times		
DVD-ROM Single Layer	< 140 ms (typical)	< 140 ms (typical)
CD-ROM Mode 1	< 125 ms (typical)	< 125 ms (typical)
Full Stroke DVD	< 250 ms (seek)	< 250 ms (seek)
Full Stroke CD	< 210 ms (seek)	< 210 ms (seek)
Power		
Source	SATA DC power receptacle	SATA DC power receptacle
DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p	5 VDC ± 5%-100 mV ripple p-p
	12 VDC ± 5%-200 mV ripple p-p	12 VDC ± 5%-200 mV ripple p-p

DC Current	5 VDC – <1000 mA typical, < 1600 mA maximum	5 VDC – <1000 mA typical, < 1600 mA maximum
	12 VDC – < 600 mA typical, < 1400 mA maximum	12 VDC – < 600 mA typical, < 1400 mA maximum
Operating Environmental		
Temperature	5° to 50° C (41° to 122° F)	5° to 50° C (41° to 122° F)
Relative Humidity	10% to 90%	10% to 90%
Maximum Wet Bulb Temperature	30° C (86° F)	30° C (86° F)
Operating Systems Supported	Windows 7 Professional 32-bit and 64-bit, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation. No driver is required for this device. Native support is provided by the operating system.	Windows 7 Professional 32-bit and 64-bit, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation. No driver is required for this device. Native support is provided by the operating system.

Graphics Cards

	M6000	K6000	M5000	K5200	M4000	K4200	K2200	K620	K420
# CUDA Cores	3072	2880	2048	2304	1664	1344	640	384	192
Single Precision	7.1 TFLOPs	5.2 TFLOPs	4.3 TFLOPs	3.1 TFLOPs	2.6 TFLOPs	2.1 TFLOPs	1.3 TFLOPs	0.8 TFLOPs	0.3 TFLOPs
PCIe Gen	3	3	3	3	3	2	2	2	2
Memory Size	12GB	12 GB	8 GB	8 GB	8 GB	4 GB	4 GB	2 GB	1 GB
Memory BW	317 GB/s	288 GB/s	211 GB/s	192 GB/s	192 GB/s	173 GB/s	80 GB/s	29 GB/s	29 GB/s
Slots + Display Connectors	4x DP + DVI-I	2x DP + 2x DVI	4x DP + 1x DVI	2x DP + 2x DVI	4x DP	2x DP + DVI	2x DP + DVI	DP + DVI	DP + DVI
Display Support	4	4	4	4	4	4	4	4	4
Advanced Display	SDI, SYNC, Stereo	SDI, SYNC, Stereo	SYNC	SDI, SYNC, Stereo	SYNC	SDI, SYNC, Stereo	SDI, SYNC, Stereo	SDI, SYNC, Stereo	SDI, SYNC, Stereo
Board Power	250W	225 W	150 W	150 W	120 W	108 W	68 W	45 W	41 W
SLI Support	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Form Factor	FH	FH	FH	FH	FH	FH	FH	HH	HH

	NVS310	NVS315	NVS510
# CUDA Cores	48	48	192
PCIe Gen	2	2	2
Memory Size	512 MB	1GB	2GB
Memory BW	14 GB/s	14 GB/s	28.5 GB/s
Slots + Display Connectors	DMS-59	DMS-59	Mini DP
Max Display	2	2	4
Max Power	19.5 W	19.3 W	35 W
Max Resolution	2560 × 1600 at 60Hz (DP)	2560 × 1600 at 60Hz (DP)	3840×2160 at 60Hz (DP)
Form Factor	HH	HH	HH

	K20	K40
# CUDA Cores	2496	2880
PCIe Gen	Gen 2	Gen 3
Memory Size	5GB	12GB
Memory BW	208 GB/sec	288 GB/sec
Display Support		
Board Power	225 W	235W
Supported APIs	C Based	C Based
Form Factor	FL/FH/2x W	FL/FH/2x W

Available Graphics Drivers

- Microsoft Windows 8.1 (64-bit and 32-bit)
- Microsoft Windows 7 Professional (64-bit and 32-bit)
- Microsoft Windows 10 Professional (64-bit)
- Red Hat Enterprise Linux(RHEL) 7 Desktop/Workstation

Networking

	P900
Connector	RJ-45
Controller	Intel 82574L
Memory	Integrated Dual 48K configurable transit receive FIFO Buffers
Data Rates Supported	10/100/1000 Mbps
Compliance	IEEE 802.1p, Quality of Service (QoS) Support
Bus Architecture	PCI-E 1.1
Typical Power Consumption	1.9W
Operating Temperature	32° to 131° F (0° to 55° C)
Storage Humidity	90% at 35ºC
Dimensions (H x W x D)	12cm x 5.53cm x 11.92cm
Operating System Driver Support	Windows 7 Professional 32-bit and 64-bit, Red Hat Enterprise Linux 4 (4.8 or newer), 5 (5.3 or newer), 6
Cabling Type	Category-5 up to 100m
Bracket Height	Low Profile & Full Height
Max TDP	2.9 W
# of Ports	Dual
System Interface Type	PCIe v2.0 (2.5GT/s)
Intel® Virtualization Technology for Connectivity (VT-c)	VMDq, VMDc
Speed & Slot Width	2.5 GT/s, x4 Lane

Other

MEDIA CARD READER	9 in 1	29 in 1
	Description	Description

The Media card reader device is standard in our Pseries products The device connects to a 2×5 two channel USB header on the motherboard of the system. There is no USB controller card provided. Please see the Disc Formats section below for a list of flash memory card formats that are supported.

The Media card reader mounts into our FLEX module which fits into a standard 5.25″ Optical bay.

Mounting Orientation The Media Card Reader can not be changed and is hard wired into the system

Mounting Orientation The Media Card Reader can not be changed, it only fits into the FLEX Module one way.

Interface Type

Interface Type

USB 2.0 (one channel dedicated to the separate USB port; one channel dedicated to the flash memory card slots)

USB 3.0 (one channel dedicated to the separate USB port; one channel dedicated to the flash memory card slots)

Disc Formats

Disc Formats

SD

xD-H

SDHC

xD-M

SDXC

Micro SD

Mini SD

Micro SDHC

Mini SDHC

SD

Micro SD*

SDHC

Micro SDHC*

SDXC

Micro SDXC*

Mini SD

RS-MMC

Mini SDHC

MMC

MultiMediaCard (MMC)

MMC Micro

Reduced Size MultiMediaCard (RS MMC)

MMC Mobile

(MMC Plus)

MMC Plus

(MMC Mobile)

M2

CompactFlash Card Type I (CF Type 1)

CF Type 2

MicroDrive (MD)

Memory Stick (MS)

Memory Stick Select

MS Duo

MS PRO

MS PRO DuMS PRO-HG Duo

MS XS Duo

MS XC-HG Duo

MS HG Micro*

MS XC Micro*

MS XC-HG Micro*

MMC Micro

Memory Stick Micro (M2)*

*Available with adapter

*Available with adapter

IEEE 1394a (Firewire-400) PCI Express x1 Adapter (1 internal port, 1 external port)

Data Transfer Rate	Supports up to 400 Mbps
Devices Supported	IEEE-1394 compliant devices
Bus Type	PCIe card full height PCIe slots
Ports	One IEEE-1394a bilingual 6-Pin Connector (Rear)
System Requirements	Windows 7 Professional 32-bit and 64-bit, Microsoft® Windows® XP
	Professional. Not supported on Linux. Pentium® III or higher processor 128-MB RAM 1-GB Hard Drive CD-ROM drive Built in sound system Available PCI slot
Temperature – Operating	50° to 131° F (10° to 55° C)
Temperature – Storage	–22° to 140° F (–30° to 60° C)
Relative Humidity – Operating	20% to 80%
Compliances	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
Operating Systems Supported	Windows 7 Professional 32-bit and 64-bit, Windows® XP Professional, XP Professional 64-bit. Not supported on Linux