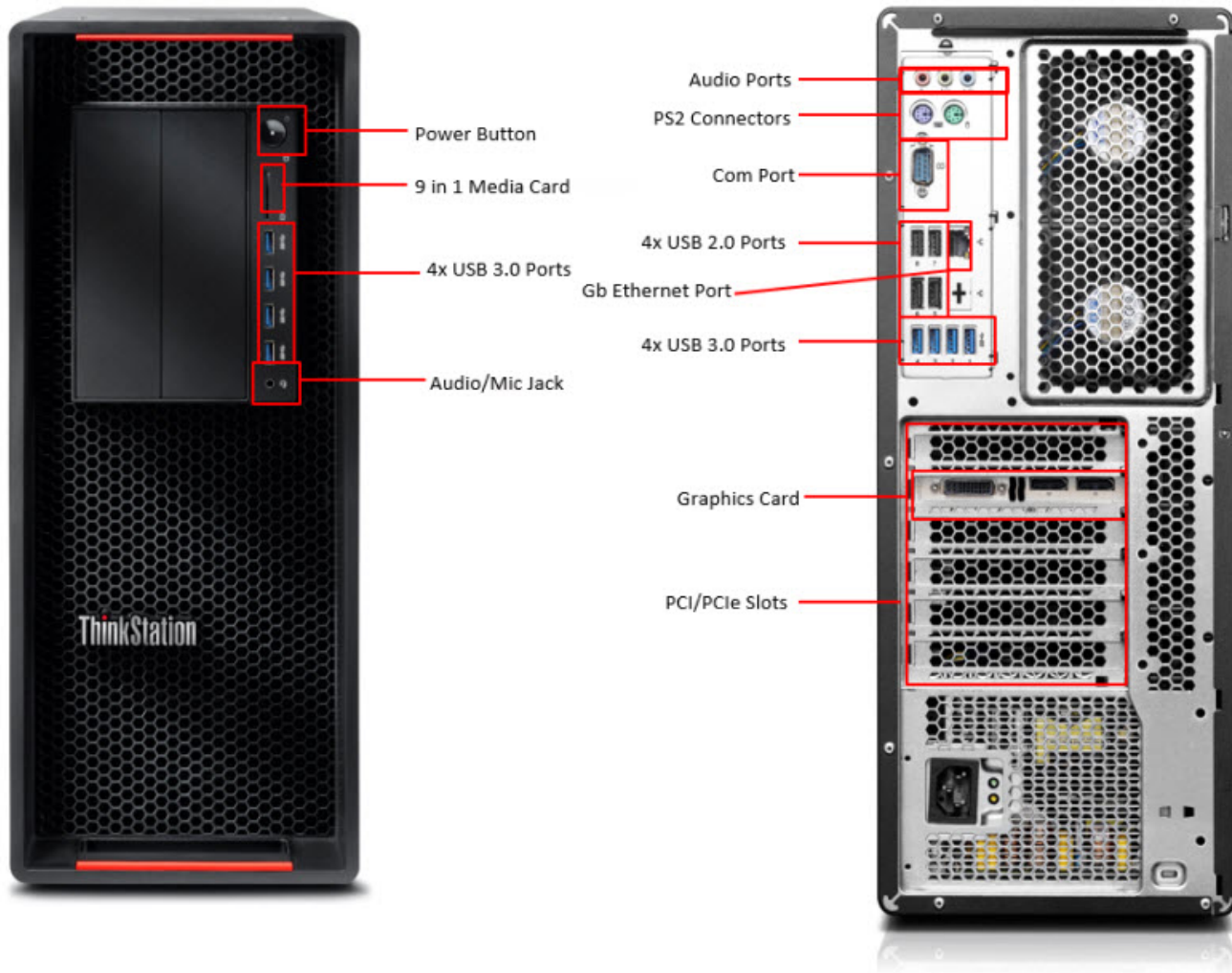


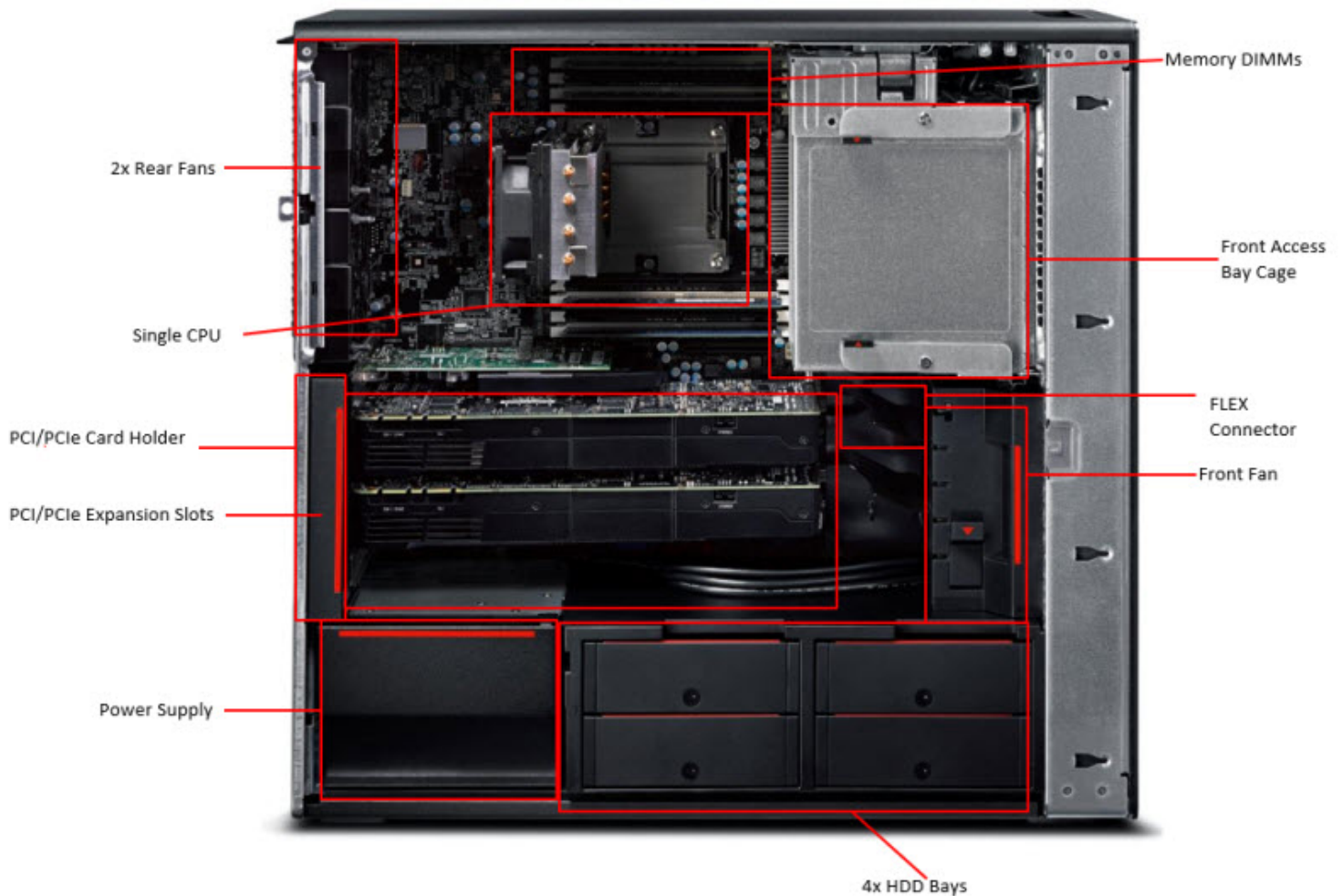


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Version: 2.0 Dec 6, 2016

### THINKSTATION P510





## Product Overview

The ThinkStation P510 is high performance single socket workstation. An Intel® Grantley-based product, the P510 provides excellent performance and quality for applications where processor, memory, graphics, and storage requirements are key. The P510 is positioned between two Grantley-based dual socket workstations, the P710 and P910, and the Denlow-refresh single socket workstations, P310 and P310SFF.

The P510 motherboard consists of the Intel® C612 Chipset, a single LGA2011-3 processor socket, supporting Intel® Xeon processors with up to 22 cores. Memory support consists of error-correcting code (ECC) unbuffered Double Data Rate 4 (DDR4) Synchronous Dynamic Random Access Memory (SDRAM). Maximum memory support of up to 256GB.

## SECTION I: SYSTEM OVERVIEW

### Operating Systems

#### Preloaded

Genuine Windows 10® Professional 64-bit

Genuine Windows 10DG to 7® Professional 64-bit

Genuine Windows 10® 64-bit

#### Supported

## Red Hat Enterprise Linux 7

**Motherboard - P510****Form Factor**

Board Size	13.15" x 11.8" (334mm x 300mm)
Layout	Custom ATX

**Motherboard Core**

Intel® Xeon™ Six Core (Broadwell EP)

Processor Support	Intel® Xeon™ Quad Core (Broadwell EP) Intel® Xeon™ Eight Core (Broadwell EP) Intel® Xeon™ Ten Core (Broadwell EP) Intel® Xeon™ Twelve Core (Broadwell EP) Intel® Xeon™ Fourteen Core (Broadwell EP) Intel® Xeon™ Sixteen Core (Broadwell EP) Intel® Xeon™ Twenty-Two Core (Broadwell EP) Intel® Xeon™ Six Core (Haswell EP)
Socket Type	Socket-R3 (LGA 2011)
Memory Support	1600/1866/2133/2400 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	8 Slots, 4 Slots on each side of CPU
Channels	4 Channels per CPU
Type	DDR4 288-Pin, 1600/1866/2133/2400 MHz RDIMM support
ECC Support	YES
Speed	Up to 2400 MHz
Max DIMM Size	Up to 32GB RDIMM
Max System Memory	Up to 256GB RDIMM

**Ethernet**

Vendor	Intel, Clarkville WGI218LM
Count	1
EEPROM	None for Clarkville

Speeds	10/100/1000 Mbps
Functions	PXE, ASF, WOL, Jumbo Frames, Teaming
Connectors	(1) 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	(2) 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	(6) x SATA Connectors, Gen. 3 (1) x eSATA Connector, Gen. 3 (eSATA bracket) (1) x SATA Connector, Gen. 3 supported by Flex Slot
eSATA	(1) x eSATA Connector, Gen. 3 (Optional eSATA bracket)

## Slots

Slot 1 (Near CPU)	PCIe x4, gen3, "open ended", Full Length without FLEX card; Half Length with FLEX card, FH
Slot 2	PCIe x16, gen3, Full Length, FH
Slot 3	PCIe x1, gen2, Full Length, FH
Slot 4	PCIe x16, gen3, Full Length, FH
Slot 5	PCI, Full Length, FH
Slot 6 (Near Edge)	PCIe x4, gen2, "open ended", Half Length, FH

## 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	(1) 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, 1 Internal to Flex Slot, 1 Internal to MCR)

USB 3.0 9 total (4 front, 4 rear, 1 internal header for HSMCR)

PS/2 Yes (2)

Audio 2x7-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 36L Rack Mountable Tower

Dimensions 440mm H x 175mm W x 470mm D (chassis only)446mm H x 175mm W x 485mm D (with rear handle & feet)

Weight 28.66lbs

Color

PSU 490 watt 90% efficient tool-less power supply650 watt 92% efficient tool-less power supply850 watt 92% efficient tool-less power supply

Thermal Solutions

Three (3) fans standard

One (1) additional front fan required for high-power PCIE adapters and to retain the flex slot (mezzanine) adapter

## 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 Program Requirements for Computers: Version 6.0 (select models)

### Energy Star

- EPEAT™ Gold rating (select models)

### EPEAT

- ErP Lot-6 2014 (via system setup option; 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), hydrochlorofluorocarbons (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<sup>2</sup>/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 E5-2699 v4 - 22 Cores, 2.2 GHz, 9.6 QPI, 55MB Cache, DDR4-2400, Turbo, HT, 145W

Intel Xeon E5-2697A v4 - 16 Cores, 2.6 GHz, 9.6 QPI, 40MB Cache, DDR4-2400, Turbo, HT, 145W

Intel Xeon E5-2690 v4 - 14 Cores, 2.6 GHz, 9.6 QPI, 35MB Cache, DDR4-2400, Turbo, HT, 135 W

Intel Xeon E5-2680 v4 - 14 Cores, 2.4 GHz, 9.6 QPI, 35MB Cache, DDR4-2400, Turbo, HT, 120W

Intel Xeon E5-2660 v4 - 14 Cores, 2.0 GHz, 9.6 QPI, 35MB Cache, DDR4-2400, Turbo, HT, 105W

Intel Xeon E5-2658 v4 - 14 Cores, 2.3 GHz, 9.6 QPI, 35MB Cache, DDR4-2400, Turbo, HT, 105W

Intel Xeon E5-2650 v4 - 12 Cores, 2.2 GHz, 9.6 QPI, 30MB Cache, DDR4-2400, Turbo, HT, 105W

Intel Xeon E5-2643 v4 - 6 Cores, 3.4 GHz, 9.6 QPI, 20MB Cache, DDR4-2400 , Turbo, HT, 135W

Intel Xeon E5-2640 v4 - 10 Cores, 2.4 GHz, 8.0 QPI, 25MB Cache, DDR4-2133 , Turbo, HT, 90W

Intel Xeon E5-2637 v4 - 4 Cores, 3.5 GHz, 9.6 QPI, 15MB Cache, DDR4-2400 , Turbo, HT, 135W

Intel Xeon E5-2630 v4 - 10 Cores, 2.2 GHz, 8.0 QPI, 25MB Cache, DDR4-2133 , Turbo, HT, 85W

Intel Xeon E5-2623 v4 - 4 Cores, 2.6 GHz, 8.0 QPI, 10MB Cache, DDR4-2133 , Turbo, HT, 85W

Intel Xeon E5-2620 v4 - 8 Cores, 2.1 GHz, 8.0 QPI, 20MB Cache, DDR4-2133 , Turbo, HT, 85W

Intel Xeon E5-2609 v4 - 8 Cores, 1.7 GHz, 6.4 QPI, 20MB Cache, DDR4-1866 , 85W

Intel Xeon E5-2603 v4 - 6 Cores, 1.7 GHz, 6.4 QPI, 15MB Cache, DDR4-1866 , 85W

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

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

**15 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 15 CPU can be installed and the CPU2 memory slots will not be functional.**

Intel Xeon E5-1660 v4 - 8 Cores, 3.2GHz, 20MB Cache, DDR4-2400, Turbo, HT, 140W

Intel Xeon E5-1660 v4 - 8 Cores, 3.2GHz, 20MB Cache, DDR4-2400, Turbo, HT, 140W

Intel Xeon E5-1650 v4 - 6 Cores, 3.6GHz, 15MB Cache, DDR4-2400, Turbo, HT, 140W

Intel Xeon E5-1630 v4 - 4 Cores, 3.7GHz, 10MB Cache, DDR4-2400, Turbo, HT, 140W

Intel Xeon E5-1620 v4 - 4 Cores, 3.5GHz, 10MB Cache, DDR4-2400, Turbo, HT, 140W

Intel Xeon E5-1607 v4 - 4 Cores, 3.1GHz, 10MB Cache, DDR4-2133, 140W

Intel Xeon E5-1603 v4 - 4 Cores, 2.8GHz, 10MB Cache, DDR4-2133, 140W

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

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

## Notes

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

**RDIMMs - 2400MHz**

8GB DDR4 ECC RDIMM PC4-2400-R 2Rx8

16GB DDR4 ECC RDIMM PC4-2400-R 2Rx4

32GB DDR4 ECC RDIMM PC4-2400-R 2Rx4



## 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"

6TB SATA - 7200rpm, 6Gb/s, 3.5"

### 3.5" Hybrid Drive

1TB SATA - 7200rpm, 6Gb/s, 3.5" Hybrid

### 2.5" SAS Hard Disk Drive (HDD)

300GB SAS - 15000rpm, 12Gb/s, 2.5"

600GB SAS - 10000rpm, 12Gb/s, 2.5"

600GB SAS - 15000rpm, 12Gb/s, 2.5"

### 2.5" SATA Solid State Drive (SSD)

256GB SATA SSD, 6Gb/s, 2.5" Non-OPAL

256GB SATA SSD, 6Gb/s, 2.5" OPAL

512GB SATA SSD, 6Gb/s, 2.5" Non-OPAL

1 TB SATA SSD , 6Gb/s, 2.5" Non-OPAL

180GB SATA SDD.6Gb/s, , 2.5" OPAL

240GB SATA SDD.6Gb/s, , 2.5" OPAL

480GB SATA SDD.6Gb/s, , 2.5" OPAL

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

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

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

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

400GB PCIe - Intel P3700 PCIe Gen 3x4 NVMe, Non-Opal

### 2.5" PCIe Solid State Drive (SSD)

400GB PCIe - Intel 750 2.5" PCIe Gen 3x4 NVMe

## 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

- LLSI 9364-8i 8-port SATA/SAS ROC Adapter(Base Mode) w/ 1GB DDR Memory Module
- 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

#### Pointing Devices

- Preferred Pro Fullsize Keyboard (USB)
- Preferred Pro Fullsize Keyboard (PS/2)
- Smart Card KYB
- Chicony KUF1256 fingerprint KB Win8
- Lenovo Slim New F5 USB Keyboard

#### Pointing Devices

- Optical Wheel Mouse (1000 DPI), USB - red wheel
- Lenovo USB Laser Mouse for win7 and win10
- PS2 black optical mouse with new logo
- 3DConnexion CadMouse

### Graphics Cards

Nvidia NVS310 (DP x 2) - 1GB DDR3

Nvidia NVS315 (with DMS-59 to Dual DVI single link dongle) - 1GB GDDR3

Nvidia NVS315 (with DMS-59 to Dual Display Port dongle) - 1GB GDDR3

Nvidia NVS 510 (mini DP x 4) - 2GB DDR3

NVS 810 (miniDPx8) - 4GB DDR3-ATX Long Offset Ext Bracket

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

NVIDIA Quadro K1200(miniDPx4) - 4GB GDDR5 - HP

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

Nvidia Quadro M2000 (Dp x 4) - 4GB ATX

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

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

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

Nvidia Quadro P5000 (DVI-D,4xDP) - 16GB GDDR5 with Long extender

Nvidia Quadro P6000 (DVI-D,4xDP) - 24GB GDDR5 with Long extender

#### NVIDIA SLI Implementations

2 x Nvidia Quadro M5000 with SLI cable

#### NVIDIA GPU Computing Processor

NVIDIA Tesla K40C 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 I210-T1 Single Port Gigabit Ethernet Adapter
	Intel I350-T2 Dual Port Gigabit Ethernet Adapter
	Intel I350-T4 Quad Port Gigabit Ethernet Adapter
	Bitland BN8E88 1000M PCIE ASF FH
Thunderbolt	Intel Thunderbolt PCIe Add-In-Card
IEE 1394	IEEE 1394a (Firewire-400) PCI Express x1 Adapter (1 external, 1 internal port)
USB	USB 3.0 PCI Express x1 Adapter
Wifi Card	Intel 7260 AC Wifi card
Parallel Card	Sunix 1 - Port IEEE1284 Parallel PCI Express x1 Communication card full Height

## SECTION III: SYSTEM TECHNICAL SPECIFICATIONS

### Power Supply Specifications

Power Supply	490W PSU	650W PSU	850W PSU
Operating Voltage Range	90-264VAC	90-264VA	90-264VA
Rated Voltage Range	100-240V	100-240V	100-240V
Rated Line Frequency	50/60Hz	50/60Hz	50/60Hz
Operating Line Frequency Range	47Hz/63Hz	47Hz/63Hz	47Hz/63Hz
Rated Input Current	8A-4A	10A - 5A	13A - 6A
Power Supply Fan	92x38mm, 5000rpm max	92x38mm, 7500rpm max	92x38mm, 5700rpm max
ENERGY STAR® qualified (Config Dependent)	*System level select models	*System level select models	*System level select models

80 PLUS Compliant	Yes 80 PLUS Gold	Yes 80 PLUS Platinum	Yes 80 PLUS Platinum
Built-in Self Test (BIST) LED	YES	YES	YES
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	YES	YES	YES
Aux Power Drop	Single Drop 6Pin	Dual Drop 6 + 8 pin Single Drop 6Pin	Dual Drop 6 + 8 pin

[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 for 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-based 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)	ATA 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 B1)
- Products do not contain Asbestos
- Products do not contain Ozone Depleting Substances: Chlorofluorocarbons (CFC), hydrobromofluorocarbons (HBFC), hydrochlorofluorocarbons (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<sup>2</sup>/week
- REACH Article 33 information about substances in articles is available at: [http://www.lenovo.com/social\\_responsibility/us/en/ThinkGreen\\_products.html#environment](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

#### 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  <a href="http://www.landesk.com/lenovo">LANDesk Management Suite for ThinkVantage Technologies (www.landesk.com/lenovo)</a>  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](http://www.lenovo.com/support) and [www.lenovo.com/warranty](http://www.lenovo.com/warranty) for more details

## SECTION IV: COMPONENT SPECIFICATIONS

## HDD 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"

6TB SATA - 7200rpm, 6Gb/s, 3.5"

### 3.5" Hybrid Drive

1TB SATA - 7200rpm, 6Gb/s, 3.5"  
Hybrid

### 2.5" SAS Hard Disk Drive (HDD)

300GB SAS - 10000rpm, 12Gb/s, 2.5"

600GB SAS - 10000rpm, 12Gb/s, 2.5"

600GB SAS - 15000rpm, 12Gb/s, 2.5"

	2.5 10K SAS 300G/600G (Model:Thunderbolt)	2.5 15K SAS 600G (Model:Valkyrie BP)
Connector	SAS	SAS
Transfer Rate	12Gb	12Gb
Performance		
Spindle Speed(RPM)	10,000 +/-	15,000 +/-
Power off to Spindle Stop(sec)	20 sec	20 sec
DC Power to Drive Ready(sec)	20 sec	20 sec
Receipt of Start Unit Command to Drive Ready(sec)	20 sec	20 sec
Average Latency(sec)	2	2
Power Management		
Input(VDC)	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%
Typical(Watts)	6.01	8.03
Idle(Watts)	3.44	5.28
Dimensions		
Height(mm - Max)	15	15
Width(mm)	69.85	69.85
Depth(mm - Max)	100.45	100.45
Weight(grams)	199(maximum)	230(maximum)
Temperature		
Operating(C) Ambient	5 to 55	5 to 55
Operating(C) Base Casting	60 max	60 max
Non-Operating(C) Ambient	-40 to 70	-40 to 70
Gradient(C per Hour)	20 max	20 max

Shock					
Operating(Gs @2ms)	25		25		
Non-Operating(Gs @2ms)	400		400		
	3.5" 7200 Enterprise 4T/6T (Model:Makara)	3.5" 7200 Enterprise 4T/6T (Model:MakaraBP)	3.5" 7200 2T/3T (Model:Grenada BP-R )	3.5" 7200 500G/1T (Model:Pharaoh Oasis)	3.5" 7200RPM Hybrid2T/1T (Model:Grenada BP2H )
Connector	SATA	SATA	SATA	SATA	SATA
Transfer Rate (Gb/sec)	600MB/sec	600MB/sec	600MB/sec	600MB/sec	600MB/sec
Performance					
Spindle Speed(RPM)	7200	7200	7200	7200	7200
Power off to Spindle Stop(sec)	23 max	23 max	11 max	10 max	11 max
DC Power to Drive Ready(sec)	30 max	30 max	10 max	10 max	
Receipt of Start Unit Command to Drive Ready(sec)	30 max	30 max	17 max	10 max	
Average Latency(msec)	4.16	4.16	4.16	4.16	4.16
Power Management					
Input(VDC)	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%
Typical(Watts)	10.62(6T)	10(6T)	8 max	5.57 max	6.7 max
Idle(Watts)	8(6T)	6.2(6T)	5.4 (Idle 2)	4.21	4.5 (Idle 2)
Dimensions					
Height(mm - Max)	26.11	26.11	26.1	20	26.11
Width(mm)	101.6	101.6	101.6	101.6	101.6
Depth(mm - Max)	146.99	146.99	146.99	146.99	146.99
Weight(grams)	780 max	705 max	626 max	415 max	535
Temperature					
Operating(C) Ambient	5 to 60	5 to 60	0 to 60	0 to 60	0 to 60
Operating(C) Base Casting					
Non-Operating(C) Ambient	-40 to 70	-40 to 70	-40 to 70	-40 to 70	-40 to 70
Gradient(C per Hour)	20 max	20 max	30 max	30 max	30 max
Shock					
Operating(Gs @ 2ms)	70(read) 40(write)	70(read) 40(write)	70 max	80 max	80 max
Non-Operating(Gs @ 2ms)	250 6T,300 other	250 6T,300 other	350 max	300 max	300 max

## SSD Specifications

### 2.5" SATA Solid State Drive (SSD)

128GB SATA SSD, 6Gb/s, , 2.5" Non-  
OPAL

180GB SATA SSD. 6Gb/s. , 2.5" OPAL

240GB SATA SSD, 6Gb/s, , 2.5" OPAL

256GB SATA SSD, 6Gb/s, , 2.5" Non-



## OPAL

256GB SATA SSD, 6Gb/s, , 2.5" OPAL

480GB SATA SSD, 6Gb/s, , 2.5" OPAL

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), Gen3x4, OPAL NVMe

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

**2.5 PCIe Solid State Drive (SSD)**

400GB PCIe -Intel 750 2.5" PCIe Gen 3x4 NVMe

400GB PCIe -Intel 3700 2.5" PCIe Gen 3x4 NVMe Non-Opal

	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	512GB SATA SSD, 6Gb/s, 2.5" OPAL
Min Sequential Read	540 MB/s	540 MB/s	540 MB/s	460 MB/s	520 MB/s	520 MB/s	520 MB/s	530 MB/s
Min Sequential Write	490 MB/s	490 MB/s	490 MB/s	270 MB/s	450 MB/s	450 MB/s	440 MB/s	495 MB/s
Min Random Read (8GB Span)	41000 IOPS	41000 IOPS	48000 IOPS	77000 IOPS	92000 IOPS	92000 IOPS	86000 IOPS	70000 IOPS
Min Random Write (8GB Span)	49000 IOPS	49000 IOPS	37000 IOPS	60000 IOPS	38000 IOPS	38000 IOPS	53000 IOPS	60000 IOPS
Min Power - Active	165 mW	165 mW	165 mW	155 mW	155 mW	155 mW	155 mW	100 mW
Min Power - Idle	55 mW	55 mW	55 mW	75 mW	75 mW	75 mW	75 mW	40 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

	1 TB SATA SSD , 6Gb/s, 2.5" Non-OPAL	2 TB SATA SSD , 6Gb/s, 2.5" OPAL
Min Sequential Read	560 MB/s	530 MB/s
Min Sequential Write	510 MB/s	500 MB/s
Min Random Read (8GB Span)	100,000 IOPS	920,000 IOPS
Min Random Write (8GB Span)	88,000 IOPS	83,000 IOPS
Min Power - Active	150 mW	150 mW
Min Power - Idle	70 mW	110 mW
Min MTBF	1.5M hours	1.5M hours
Hardware Encryption	AES 256 bit	AES 256 bit

Interface	PCIe Gen3 x4 OPAL NVMe	PCIe Gen3 x4 NVMe
Capacity	256GB	512GB

Performance	Sequential Read	2,250 MB/s	2,600 MB/s
	Sequential Write	1,250 MB/s	1,500 MB/s
	Random Read	295,000 IOPS	310,000 IOPS
	Random Write	93,000 IOPS	100,000 IOPS
Power Consumption		6.5W	5.5W

	400GB PCIe - Intel P3700	400GB PCIe -Intel 750 2.5"
Sequential Read	2700 MB/s	2300 MB/s
Sequential Write	1080 MB/s	1000 MB/s
Random Read (100% Span)	450000 IOPS	450000 IOPS
Random Write (100% Span)	75000 IOPS	200000 IOPS
Latency - Read	20 µs	20 µs
Latency - Write	20 µs	20 µs
Power - Active	12W (write), 9W (read)	12
Power - Idle	4w	4
Operating Temperature Range	0°C to 55°C	0°C to 35°C
Endurance Rating (Lifetime Writes)	10 DWPD	70GB per day
Mean Time Between Failures (MTBF)	2,000,000 Hrs	1.2M hours
Interface	PCIe Gen 3x4	PCIe Gen 3x4

## HDD Controllers

### LSI 9364-8i 8-port SATA/SAS ROC Adapter(Base Mode) w/ 1GB DDR Memory Module

#### LSI SAS/SATA RAID Flex adapter

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

Desktop/Workstation. No driver is required for this device. Native support is provided by the operating system.Desktop/Workstation. No driver is required for this device. Native support is provided by the operating system.Desktop/Workstation. No driver is required for this device. Native support is provided by the operating system.Desktop/Workstation. No driver is required for this device. Native support is provided by the operating system.

	DVD-ROM Drive - 16x/48x (SATA)	DVD Burner/CD-RW Rambo Drive (SATA)	Blu-Ray Burner Drive w/AACS encryption (SATA)	DVD Burner/CD-RW Rambo Drive (9.5mm Slim SATA)
Description	5.25-inch, half-height, tray-load	5.25-inch, half-height, tray-load	5.25-inch, half-height, tray-load	9.5mm slim, tray-load
Mounting Orientation	Either horizontal or vertical	Either horizontal or vertical	Either horizontal or vertical	Either horizontal or vertical
Interface Type	SATA/ATAPI	SATA/ATAPI	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)	(WxHxD) 15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)	(WxHxD) 128 x 9.5 x 127cm MAX
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	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)	< 140 ms (typical)	< 160 ms (typical)
CD-ROM Mode 1	< 125 ms (typical)	< 125 ms (typical)	< 125 ms (typical)	< 140 ms (typical)
Full Stroke DVD	< 250 ms (seek)	< 250 ms (seek)	< 250 ms (seek)	< 250 ms (seek)
Full Stroke CD	< 210 ms (seek)	< 210 ms (seek)	< 210 ms (seek)	< 210 ms (seek)
Power				
Source	SATA DC power receptacle	SATA DC power receptacle	SATA DC power receptacle	SATA DC power receptacle
DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p  12 VDC ± 10%-200 mV ripple p-p	5 VDC ± 5%-100 mV ripple p-p  12 VDC ± 10%-200 mV ripple p-p	5 VDC ± 5%-100 mV ripple p-p  12 VDC ± 10%-200 mV ripple p-p	5 VDC ± 5%-100 mV ripple p-p
DC Current	5 VDC - <1000 mA typical, < 1600 mA  maximum  12 VDC - < 1000 mA typical, < 2000 mA  maximum	5 VDC - <1000 mA typical, < 1600 mA  maximum  12 VDC - < 1000 mA typical, < 2000 mA  maximum	5 VDC - <1100 mA typical, < 2000 mA  maximum  12 VDC - < 1600 mA typical, < 2500 mA  maximum	5 VDC - <1000 mA typical, < 1500 mA  maximum
Operating Environmental				
Temperature	5° to 50° C (41° to 122° F)	5° to 50° C (41° to 122° F)	5° to 50° C (41° to 122° F)	5° to 50° C (41° to 122° F)
Relative Humidity	8% to 80%	8% to 80%	8% to 80%	8% to 80%
Maximum Wet Bulb Temperature	30° C (86° F)	30° C (86° F)	30° C (86° F)	30° C (86° F)
Operating Systems Supported	Windows 10 Professional or Home 64-bit  Windows 7 Professional 64-bit  Red Hat Enterprise Linux (RHEL) 7.2	Windows 10 Professional or Home 64-bit  Windows 7 Professional 64-bit  Red Hat Enterprise Linux (RHEL) 7.2	Windows 10 Professional or Home 64-bit  Windows 7 Professional 64-bit  Red Hat Enterprise Linux (RHEL) 7.2	Windows 10 Professional or Home 64-bit  Windows 7 Professional 64-bit  Red Hat Enterprise Linux (RHEL) 7.2

## Graphics Cards

	P6000	P5000
# CUDA Cores	3840	2560
Single Precision		
PCIe Gen	3	3
Memory Size	24G	16G
Memory BW	433 GB/s	288 GB/s
Slots + Display Connectors	4xDP+DVI-D	4xDP+DVI-D

Display Support	5	5		
Advanced Display	SDI, SYNC, Stereo	SDI, SYNC, Stereo		
Board Power	250W	180W		
SLI Support	Yes	Yes		
Form Factor	FH	FH		
	<b>M6000</b>	<b>M5000</b>	<b>M4000</b>	<b>M2000</b>
# CUDA Cores	3072	2048	1664	768
Single Precision	7.1 TFLOPs	4.3 TFLOPs	2.6 TFLOPs	1.8 TFLOPs
PCIe Gen	3	3	3	3
Memory Size	12GB	8 GB	8 GB	4GB
Memory BW	317 GB/s	211 GB/s	192 GB/s	105.7 GB/s
Slots + Display Connectors	4x DP + DVI-I	4x DP + 1x DVI	4x DP	4x DP
Display Support	4	4	4	4
Advanced Display	SDI, SYNC, Stereo	SYNC	SYNC	N/A
Board Power	250W	150 W	120 W	75W
SLI Support	Yes	Yes	Yes	No
Form Factor	FH	FH	FH	FH
	<b>K2200</b>	<b>K1200</b>	<b>K620</b>	<b>K420</b>
# CUDA Cores	640	512	384	192
Single Precision	1.3 TFLOPs	1 TFLOPs	0.8 TFLOPs	0.3 TFLOPs
PCIe Gen	2	2	2	2
Memory Size	4 GB	4GB	2 GB	1 GB
Memory BW	80 GB/s	80 GB/s	29 GB/s	29 GB/s
Slots + Display Connectors	2x DP + DVI	4x mDP	DP + DVI	DP + DVI
Display Support	4	4	4	4
Advanced Display	N/A	N/A	N/A	N/A
Board Power	68 W	46 W	45 W	41 W
SLI Support	No	No	No	No
Form Factor	FH	LP	HH	HH
	<b>NVS310</b>	<b>NVS315</b>	<b>NVS510</b>	<b>NVS810</b>
# CUDA Cores	48	48	192	1024(512 per GPU)
PCIe Gen	2	2	2	3
Memory Size	512 MB	1GB	2GB	4GB
Memory BW	14 GB/s	14 GB/s	28.5 GB/s	28.8 GB/s
Slots + Display Connectors	DP	DMS-59	Mini DP	Mini DP
Max Display	2	2	4	8
Max Power	19.5 W	19.3 W	35 W	68 W
Max Resolution	2560 × 1600 at 60Hz (DP)	2560 × 1600 at 60Hz (DP)	3840×2160 at 60Hz (DP)	4096×2160 at 30Hz (DP)

Form Factor	HH	HH	HH	FH
	<b>K40C</b>			
# CUDA Cores	2880			
PCIe Gen	Gen 3			
Memory Size	12GB			
Memory BW	288 GB/sec			
Display Support				
Board Power	235W			
Supported APIs	C Based			
Form Factor	FL/FH/2x W			

### Available Graphics Drivers

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

### Networking

	P510
Connector	RJ-45
Controller	Intel, Clarkville WGI210AT Intel, Clarkville WGI218LM

#### Intel i218 Gigabit Ethernet - LM

Lithography	40 nm
TDP	0.5 W
Operating Temperature Range	0 °C to 85 °C
# of Ports	Single
Data Rate Per Port	1 Gbps
Jumbo Frames Supported	Yes
1000Base-T	Yes
Supported Under vPro	Yes

#### Intel i210 Gigabit Ethernet - AT

Operating Temperature Range	0 °C to 70 °C
# of Ports	Single
Data Rate Per Port	1 Gbps
System Interface Type	PCIe v2.1 (2.5GT/s)
NC Sideband Interface	Yes
Jumbo Frames Supported	Yes
1000Base-T	Yes
MACsec IEEE 802.1 AE	No

**Other****MEDIA CARD READER**

9 in 1

29 in 1

## Description

The Media card reader device is standard in our Pseries products. The device connects to a 2x5 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.

## Description

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

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

## Interface Type

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

## Disc Formats

SD

SDHC

SDXC

Mini SD

Mini SDHC

Micro SD\*

Micro SDHC\*

Micro SDXC\*

RS-MMC

MMC

MMC Micro

MMC Mobile

MMC Plus

M2

## Disc Formats

xD-H

xD-M

Micro SD

Micro SDHC

SD

SDHC

SDXC

Mini SD

Mini SDHC

MultiMediaCard (MMC)

Reduced Size MultiMediaCard (RS MMC)

(MMC Plus)

(MMC Mobile)

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	Genuine Windows 10® Professional 64-bit, Genuine Windows 10DG to 7® Professional 64-bit  Not supported on Linux.  Premium® 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

	Intel I210-T1 Single Port Gigabit Ethernet Adapter	Intel I350-T2 Dual Port Gigabit Ethernet Adapter	Intel I350-T4 Quad Port Gigabit Ethernet Adapter
Cable Medium	Copper	Copper	Copper
Cabling Type	RJ-45 Category-5, up to 100 m	Cat 5 up to 100m	Cat 5 up to 100m
Bracket Height	Low Profile and Full Height	Low Profile and Full Height	Low Profile and Full Height
TDP	1W	4.4W	5W
# of Ports	Single	Dual	Quad
System Interface Type	PCIe 2.1(2.5GT/s)	PCIe v2.1 (5.0GT/s)	PCIe v2.1 (5.0GT/s)
Intel® Virtualization Technology for Connectivity (VT-c)		Yes	Yes
Speed & Slot Width	2.5 GT/s, x1 Lane	5 GT/s, x4 Lane	5 GT/s, x4 Lane
Controller	Intel I210	Intel I350	Intel I350
iWARP/RDMA	No	No	No
Intel® Ethernet Power Management	Yes	Yes	Yes
Intel® Data Direct I/O Technology	No		
Intelligent Offloads	Yes	Yes	Yes
Storage Over Ethernet		iSCSI, NFS	iSCSI, NFS
On-chip QoS and Traffic Management	No	Yes	Yes
Flexible Port Partitioning	No	Yes	Yes

8/31/2017

Thinkstation-specs » Thinkstation P510

Virtual Machine Device  
Queues (VMDq) No

Yes

Yes

PCI-SIG\* SR-IOV Capable No

Yes

Yes