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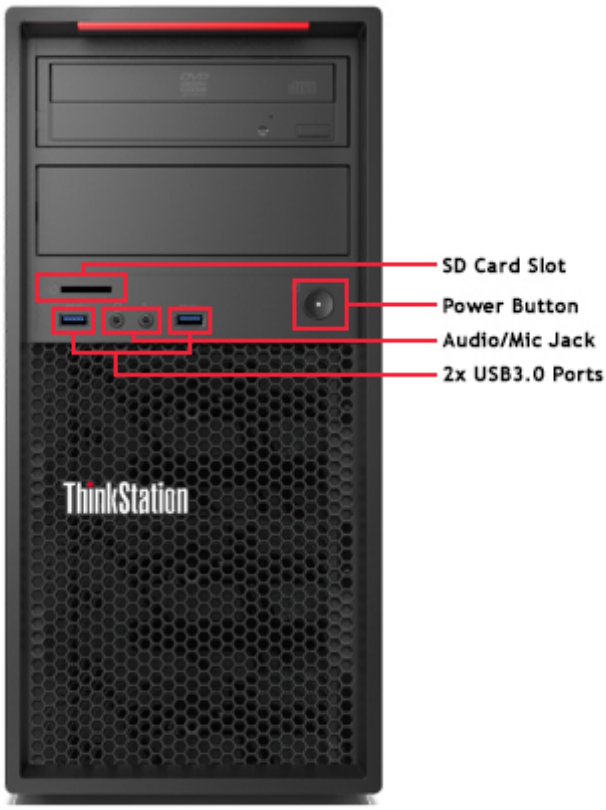
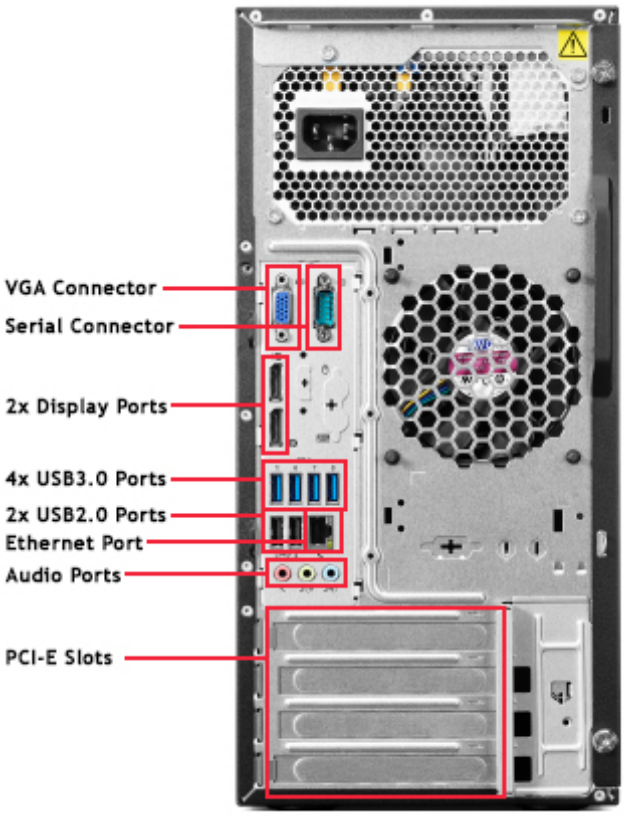
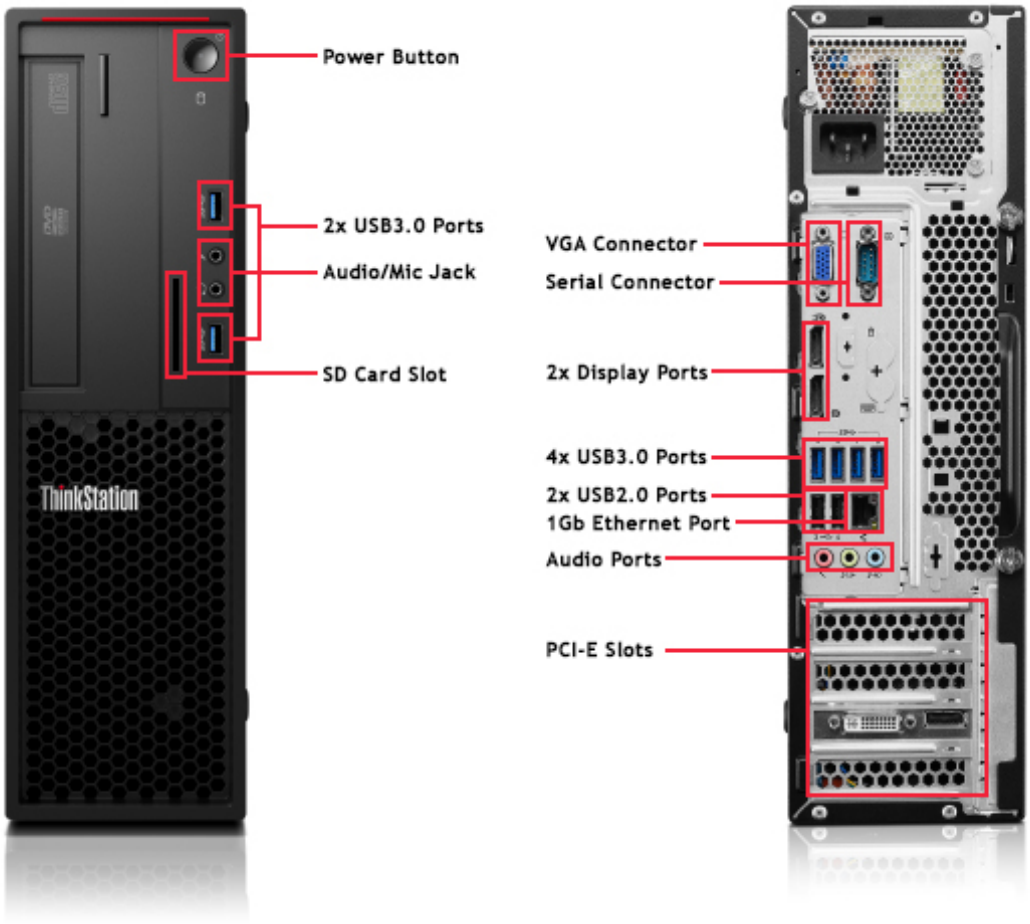
THINKSTATION P310 TOWER & SFF







Section I: System Overview Tower

System Overview

P310 Tower

The single-processor workstation P310 uses a Micro Advanced Technology Extended (MATX) motherboard, both 250 watt (W), and an optional 400 watt (W) power supply unit (PSU). The motherboard chipset consists of the Intel® PCH supporting error-correcting code (ECC) Double Data Rate 4 (DDR4). Maximum memory supported is 64GB for UDIMMs. The processor socket is an Intel® LGA1150 GA-C2 level with support for dual core, quad core, processors from the Intel® Xeon line (E3-1200V5 family of processors) as well as Core i processors (i3, i5, i7).

P310 SFF

The single-processor workstation P310 uses a Micro Advanced Technology Extended (MATX) motherboard, with a 210 watt(W) power supply unit (PSU). The motherboard chipset consists of the Intel® PCH supporting error-correcting code (ECC) Double Data Rate 4 (DDR4). Maximum memory supported is 64GB for UDIMMs. The processor socket is an Intel® LGA1150 GA-C2 level with support for dual core, quad core, processors from the Intel® Xeon line (E3-1200V5 family of processors) as well as Core i (i3, i5, i7).

Operating Systems

P310 Tower

Preloaded

Genuine Windows 10DG to 7® Professional 64-bit
Genuine Windows 10® Professional 64-bit
Genuine Windows 10® 64-bit

Supported

Red Hat Enterprise Linux 6.4

P310 SFF

Preloaded

Genuine Windows 10DG to 7® Professional 64-bit
Genuine Windows 10® Professional 64-bit
Genuine Windows 10® 64-bit

Supported

Red Hat Enterprise Linux 6.4

Motherboard – P310

Form Factor	**P310 Tower**	**P310 SFF**
Board Size	248mm	248mm
Motherboard Core		
Processor Support	Intel® Xeon™ E3-1200V5	Intel® Xeon™ E3-1200V5
	Intel® i7™ Quad Core	Intel® i7™ Quad Core
	Intel® i5™ Quad Core	Intel® i5™ Quad Core
	Intel® i3™ Dual Core	Intel® i3™ Dual Core
Socket Type	LGA1151	LGA1151
Memory Support	2133 MHz	2133 MHz
QPI (GTPS)	up to 9.6GT/s	up to 9.6GT/s
Voltage Regulator	80W TDP	80W TDP
Chipset (PCH)	Intel C236	Intel C236
Flash	16MB	16MB
HW Monitor	-	-
Super I/O	Nuvoton NCT6685D	Nuvoton NCT6685D
Clock	Greenlow Native isCLK(Intel C236)	Greenlow Native isCLK(Intel C236)
Audio	ALC662VD-GR	ALC662VD-GR
Ethernet	Intel I219-LM	Intel I219-LM
Memory		
Slots	4	4
Channels	2	2
Type	UDIMM	UDIMM
ECC Support	Yes (with Xeon Processor)	Yes (with Xeon Processor)
Speed	2133 MHz	2133 MHz
Max DIMM Size	16GB	16GB
Max System Memory	64GB	64GB
Ethernet		
Vendor	Intel	Intel
Count	1	1
EEPROM	None	None
Speeds	10/100/1000 Mbps	10/100/1000 Mbps
Functions	PXE, WOL,AMT	PXE, WOL,AMT
Connectors	(1) x RJ45 on Rear I/O	(1) x RJ45 on Rear I/O
Audio		

Type	Integrated Audio	Integrated Audio
Chipset	ALC662VD-GR	ALC662VD-GR
Stereo Conversion	24-bit DAC and 24-bit ADC	24-bit DAC and 24-bit ADC
High Definition Stereo Support	v	v
Number of Channels	2 channels (5.1 via Driver Selection)	2 channels (5.1 via Driver Selection)
Number of Bits/Audio Resolution	6 channels of DAC support 16/20/24-bit PCM format for 5.1 audio solution 2 stereo ADC support 16/20-bit PCM format	6 channels of DAC support 16/20/24-bit PCM format for 5.1 audio solution 2 stereo ADC support 16/20-bit PCM format
Sampling Rate (recording/playback)	Support 44.1K/48K/96K sample rate	Support 44.1K/48K/96K sample rate
Signal to Noise Ratio	DAC SNR>98dBFSA, ADC SNR>90dBFSA	DAC SNR>98dBFSA, ADC SNR>90dBFSA
Wavetable Voices	32-voice wavetable(For XP only)	32-voice wavetable(For XP only)
Analog Audio	v	v
Dolby Digital	None	None
THX	None	None
Digital Out (S/PDIF)	None	None
Speaker Power Rating	Int Speaker (1.5W) / Ext 2.0 Speaker (4W)	Int Speaker (1W) / Ext 2.0 Speaker (4W)
Video		
Onboard	Supported (On some Processors)	Supported (On some Processors)
Type	Integrated (Some Processors)	Integrated (Some Processors)
Bus Interface	Processor onboard	Processor onboard
Display Interface	VGA/DP/DP	VGA/DP/DP
Video Resolution (max)	DP: 4096×2304@60Hz	DP: 4096×2304@60Hz
Graphics Cover Name	Intel HD Graphics 530	Intel HD Graphics 530
Storage		
Floppy	None	None
IDE	None	None
SATA	(5) x SATA Connectors, Gen. 3 (1) x eSATA Connector, Gen. 3	(5) x SATA Connectors, Gen. 3 (1) x eSATA Connector, Gen. 3
	SATA RAID 0,1,5,10 supported natively via Intel Controller	SATA RAID 0,1,5 supported natively via Intel Controller
eSATA	(1) x eSATA Connector, Gen. 3	(1) x eSATA Connector, Gen. 3
Slots		
PCI	No	No
Available Slots	No	No
PIN Count	No	No
Data Bus Width	No	No
Voltage	No	No
PCI Express x1	2pcs	2pcs

Available Slots	1 Full High	1 Low Profile
PIN Count	36 pins connectors	36 pins connectors
Data Bus Width	500MB/s per Direction; duplex 16GB/s	500MB/s per Direction; duplex 16GB/s
Voltage	12V	12V
Power (Max)	25W	25W
PCI Express x4	Yes	Yes
Available Slots	1 Full Height	1 Half High
PIN Count	164 pins connectors	164 pins connectors
Data Bus Width	8GB/s per Direction ; duplex 1GB/s	8GB/s per Direction ; duplex 1GB/s
Voltage	12V	12V
Power (Max)	75W	45W
PCI Express x16	Yes	Yes
Available Slots	1 Full High	1 Half High
PIN Count	164 pins connectors	164 pins connectors
Data Bus Width	8GB/s per Direction; duplex 16GB/s	8GB/s per Direction; duplex 16GB/s
Voltage	12V	12V
Power (Max)	75W	45W

I/O

Front

High Speed USB 3.0	2	2
Internal High Speed USB 2.0	0	0
Microphone	1	1
Headphone	1	1

Back

High Speed USB 2.0	2	2
High Speed USB 3.0	4	4
1 standard serial, 1 optional via punching out	Yes	Yes
Optional parallel	Yes(header on MB)	No
2 PS/2	Yes(header on MB)	optional, via punching out
integrated VGA port	1	1
integrated Display port	2	2
RJ45	1	1
RJ11 (on selected models)	0	0
IEEE 1394 (on selected models)	0	0
Audio Line in	1	1
Audio line out	1	1

Mic In	1	1
eSATA	1 optional E-SATA	1 optional E-SATA
Thermal		
Temp Sensors	Ambient Cable Thermal Sensor	Ambient Cable Thermal Sensor
	VR Temperature Sensor	VR Temperature Sensor
	PSU Thermal Sensor(inside)	PSU Thermal Sensor(inside)
Fans	Rear SYSTEM Fan x1 4-pin header with 4-pin key	Rear SYSTEM Fan x1 4-pin header with 4-pin key
	Front Fan 4-pin header with 4 pin key	Front Fan 4-pin header with 4 pin key
	ODD bay Fan 4-pin header with 3-pin key	ODD bay Fan 4-pin header with 3-pin key
	PSU Fan Main PSU power connector	PSU Fan Main PSU power connector
	CPU Fan Header x1 4-pin header with 4-pin key	CPU Fan Header x1 4-pin header with 4-pin key
Power Connectors		
Main	(1) 10-Pin (2×5) ATX Standard	(1) 10-Pin (2×5) ATX Standard
Memory & CPU	4-Pin	4-Pin
Graphics	6-Pin (400W) (None for 250W)	None
Security		
TPM	TPM 1.2	TPM 1.2
Asset ID	Rohm BUL08-1FJ-W/FVJ-W/NXP PCA24S08AD	Rohm BUL08-1FJ-W/FVJ-W/NXP PCA24S08AD
vPro	E3 12xx v5 yes	E3 12xx v5 yes
BIOS		
Vendor	AMI	AMI

Chassis Information

P310 Tower	P310 SFF
25L Rack Mountable Tower	12L Rack Mountable Tower
425mm H x 175mm W x 431mm D	338mm H x 102mm W x 375mm D
TWR(13kg(net weight)+1.3kg(carton+paper)+0.47kg(plastic)+0.9375kg(wood) = 15.7075 kg)	SFF(7.9kg(net weight)+1.05kg(carton+paper)+0.36kg(plastic)+0.9375kg(wood) = 10.2475 kg)
250 watt 85% efficient tool-less power supply 400 watt 92% efficient tool-less power supply	210 watt 85% efficient tool-less power supply 210 watt 92% efficient tool-less power supply
Rear Fan Standard – Optional Front fan required for some configurations	Rear Fan Standard – Optional Front fan required for some configurations

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	Operating 20% ~ 80% (non-condensing) Non-Operating 20% ~ 90%(non-condensing) • Wet Bulb Temperature Operating: 25°C max
Altitude	Operating: -15.2 m to 3048 m (-50 ft to 10 000 ft)
Vibration	With Packaging 1.04 G at 2 to 200 Hz at 1 octave/min Operating: 0.27 G at 5 to 500 Hz at 0.5 octave/min,Ramdom(without LCD panel) Non- operatig 1.04 G at 2 to 200 Hz at 1 octave/min
Shock	Without Package: Bottom half-sine pulse with a change in velocity of 37.4 cm/sec (14.7 inches/sec)

	Operating: 45-G faired square wave with a velocity change of 441 cm/sec (173.7 inches/sec)

Regulations and Standards

EMC & Safety

FCC DoC for North America	Yes
VCCI certification for Japan	Yes
BSMI certification for Taiwan	Yes
EU/EFTA CE Mark & DoC	Yes
UL/CUL	Yes
TUV-GS	Yes
IEC60950-1 CB Report/Certificate	Yes
Saudi Arabia ICCP(SASO)	Yes
China CCC Mark	Yes
Hong Kong SAR (CB report)	Yes
Argentina S-mark	Yes
Singapore – PSB	Yes
South Africa – SABS	Yes
Russia-GOST/EAC	Yes
Mexico-NOM	Yes
Kazakhstan -GOST-K /EAC	Yes
Belarus-certificate/EAC	Yes
Croatia-certificate/CE	Yes
Serbia – KVALITET	Yes
Ukraine – UKrCEPRO	Yes
Energy Star 6.1	Yes
PERD(Product Environmental Review Database	Yes
China RoHS	Yes
EU RoHS	Yes
EU WEEE	Yes
Japan J-Moss	Yes
California RoHS	Yes
USA Chemical Emission Test	Yes
New York RoHS	Yes
Japan Energy Saving	Yes

Environmentals

Energy Star	Energy Star Program Requirements for Computers: Version 6.1 (select models)

EPEAT	EPEAT™ Gold rating (select models)
EuP Lot-3 2013	EuP Lot-3 2013 (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/cm²/week.

Section II: Supported Components

Processor

E3-1280 v5 (3.7GHz / 4C / 8M / 2133 / 80W / Turbo / HT / GT0)

E3-1275 v5 (3.6GHz / 4C / 8M / 2133 / 80W / Turbo / HT / GT2)

E3-1270 v5 (3.6GHz / 4C / 8M / 2133 / 80W / Turbo / HT / GT0)

E3-1245 v5 (3.5GHz / 4C / 8M / 2133 / 80W / Turbo / HT / GT2)

E3-1240 v5 (3.5GHz / 4C / 8M / 2133 / 80W / Turbo / HT / GT0)

E3-1230 v5 (3.4GHz / 4C / 8M / 2133 / 80W / Turbo / HT / GT0)

E3-1225 v5 (3.3GHz / 4C / 8M / 2133 / 80W / Turbo / GT2)

E3-1220 v5 (3.0GHz / 4C / 8M / 2133 / 80W / Turbo / GT0)

i7-6700 (3.4GHz / 4c / 8M / 2133 / 65W)

i5-6600 (3.3GHz / 4c / 6M / 2133 / 65W)

i5-6500 (3.2GHz / 4c / 6M / 2133 / 65W)

i5-6400 (2.7GHz / 4c / 6M / 2133 / 65W)

I3-6100 (3.7GHz / 2C / 3M /2133 / 65W)

I3-6300 (3.8GHz / 2C / 4M /2133 / 65W)

I3-6320 (3.9GHz / 2C / 4M /2133 / 65W)

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

UDIMMs – 2133MHz

4GB PC4-2133MHz DDR4 ECC-UDIMM

8GB PC4-2133MHz DDR4 ECC-UDIMM

16GB PC4-2133MHz DDR4 ECC-UDIMM

4GB PC4-2133MHz DDR4 non-ECC-UDIMM

8GB PC4-2133MHz DDR4 non-ECC-UDIMM

16GB PC4-2133MHz DDR4 non-ECC-UDIMM

Storage

3.5″ SATA Hard Disk Drive (HDD)

500GB SATA – 7200 rpm, 6 Gb/s, 3.5″

1TB SATA – 7200 rpm, 6 Gb/s, 8MB cache, 3.5″

2TB SATA – 7200 rpm, 6 Gb/s, 3.5″

3TB SATA – 7200 rpm, 6Gb/s 3.5″

4TB SATA – 7200 rpm, 6Gb/s 3.5″

3.5″ Hybrid Drive

1TB SATA – 7200rpm,(8G Flash) 6Gb/s, 3.5″ Hybrid

2TB SATA – 7200rpm, (8G Flash) 6Gb/s, 3.5″ Hybrid

2.5″ SATA Solid State Drive (SSD)

128GB SATA 3 Solid State Drive (SSD) 2.5″,6Gb/s

180GB SATA 3 Solid State Drive (SSD) 2.5″, 6Gb/s OPAL

240GB SATA 3 Solid State Drive (SSD) 2.5″, 6Gb/s – OPAL

256GB SATA 3 Solid State Drive (SSD) 2.5″, 6Gb/s

256GB SATA 3 Solid State Drive (SSD) 2.5″, 6Gb/s OPAL

480GB SATA 3 Solid State Drive (SSD) 2.5″, 6Gb/s OPAL

512GB SATA 3 Solid State Drive (SSD),2.5″

1TB SATA 3 Solid State Drive (SSD) 2.5″

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

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.

Optical Drive/Removable Media

DVD-ROM Drive (SATA)

DVD-ROM Drive – 16x/48x (SATA)

Slim DVD-ROM

DVD Burner/CD-RW Rambo Drive (SATA)

DVD Burner/CD-RW Rambo Drive (SATA)

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

Blu-Ray Burner Drive (SATA)

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

Slim Blu-Ray ODD DVD Burner (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)

Smart Card KYB

Chicony KUF1256 fingerprint KB

Lenovo Slim New F5 USB Keyboard

Pointing Devices

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

Lenovo USB Laser Mouse

Graphics Cards

P310 Tower	P310 SFF
NVIDIA NVS310 (DP, DP)	NVIDIA NVS310 (DP, DP)
NVIDIA NVS315 (DMS-59) - 1GB GDDR3 w/ DMS-59 to Dual DVI Dongle(single link) - HP	NVIDIA NVS315 (DMS-59) - 1GB GDDR3 w/ DMS-59 to Dual DVI Dongle(single link) - LP
NVIDIA NVS315 (DMS-59) - 1GB GDDR3 w/ DMS-59 to Dual DP Dongle - HP	NVIDIA NVS315 (DMS-59) - 1GB GDDR3 w/ DMS-59 to Dual DP Dongle - LP
NVIDIA 510 (mini DP x4) - 2GB GDDR3 with 4x miniDP to DP Dongle - HP	NVIDIA 510 (mini DP x4) - 2GB GDDR3 with 4x miniDP to DP Dongle - LP
NVS 810 (miniDPx8) - 4GB DDR3-ATX w/ short ext.	Nvidia Quadro K420(DP/DVI) - 2GB DDR3-LP
Nvidia Quadro K420(DP/DVI) - 2GB DDR3- HP	NVIDIA Quadro K620 (DVI, DP) - 2GB DDR3 - LP
NVIDIA Quadro K620 (DVI, DP) - 2GB DDR3 - HP	NVIDIA Quadro K1200(miniDP x4) - 4GB GDDR5 - LP
NVIDIA Quadro K1200(miniDPx4) - 4GB GDDR5 - HP	
NVIDIA Quadro K2200(DVI, DP x2) - 4GB GDDR5 - HP	
NVIDIA Quadro M4000(DP x4) - 8GB GDDR5 ATX with short extender - HP	

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…

PCIe

Network	Integrated Gigabit Ethernet
	Intel® I210-T1 Single Port Gigabit Ethernet Adapter
	Intel® I350-T2 Dual Ports Gigabit Ethernet Adapter
	Intel® I350-T4 Quad Ports Gigabit Ethernet Adapter
Thunderbolt	Intel Thunderbolt Add-In Card (optional)
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	SoundBlaster Z audio card optional
	Lenovo Branded 2-Piece Speaker Set
	Speaker Brick

Section III: System Technical Specifications

Power Supply Specifications

	P310 Tower		P310 SFF	
Power Supply	250W	400W	210W	210W
Power Efficiency	85%	92%	85%	92%
Manual / Auto-sensing	auto-sensing	auto-sensing	auto-sensing	auto-sensing
Wattage	250W	400W	210W	210W
AC Input Voltage Range	100~240v	100~240v	100~240v	100~240v
AC Input Current (low ac range/high AC range)	4A	6A	3A	6A
	47~63 HZ	47~63 HZ	47~63 HZ	47~63 HZ
AC Holdup Time (50% load)	17ms	17ms	17ms	17ms
Minimum Efficiency	0.82	0.9	0.82	0.9
PFC (Active)	active	active	active	active

ThinkStation Power Calculator

BIOS Specifications

Features	
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 low 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.
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 10 ready	Supports Windows 10 requirements – Secure flash, UEFI v 2.3.1 spec

Industry Standard Specification Support

UEFI	Unified Extensible Firmware Interface v2.3.1
ACPI (Advanced Configuration and power Management Interface)	Advanced Configuration and Power Interface v4.0
ASF 2.0	DMTF Alert Standard Format Specification v2.0
ATA (IDE)	None
CD Boot	“El Torito” Bootable CD-Rom Format Specification, Version 1.0
EHCI	None, support RAID/AHCI
PCI	None
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	None
USB	Universal Serial Bus Revision 1.1
	Universal Serial Bus v2.0
	Universal Serial Bus v3.0
SMBIOS	DMTF System Management Spec v2.7.1
XHCI	eXtensible Host Controller Interface for Universal Serial Bus, Revision 3.0

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), 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/cm²/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

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

	3.5″ 7200rpm	**3.5″ Hybrid**
Connector	SATA	SATA
Transfer Rate (Gb/sec)	600MB/sec	600MB/sec
Performance		
Spindle Speed(RPM)	7200	7200
Power off to Spindle Stop(sec)	11 max	11 max
DC Power to Drive Ready(sec)	17 max	<1
Receipt of Start Unit Command to Drive Ready(sec)	17 max	<1
Average Latency(msec)	4.16	4.16

Power Management		
Input(VDC)	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%
Typical(Watts)	8 max	6.7 max
Idle(Watts)	0.75	0.75
Dimensions		
Height(mm – Max)	26.11	26.11
Width(mm)	101.6	101.6
Depth(mm – Max)	146.99	146.99
Weight(grams)	626 max	535 max
Temperature		
Operating(C) Ambient	0 to 60	0 to 60
Operating(C) Base Casting		
Non-Operating(C) Ambient	-40 to 70	-40 to 70
Gradient(C per Hour)	30 max	30 max
Shock		
Operating(Gs @ 2ms)	80 max	80 max
Non-Operating(Gs @ 2ms)	350 max	350 max

SSD Specifications

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					

Optical Drives Specifications

Interface		PCIe Gen3 x4 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

Graphics Cards

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

M4000	K4200	K2200	K620	K420

# CUDA Cores	1664	1344	640	384	192
Single Precision	2.6 TFLOPs	2.1 TFLOPs	1.3 TFLOPs	0.8 TFLOPs	0.3 TFLOPs
PCIe Gen	3	2	2	2	2
Memory Size	8GB	4 GB	4 GB	2 GB	1 GB
Memory BW	192 GB/s	173 GB/s	80 GB/s	29 GB/s	29 GB/s
Slots + Display Connectors	4x DP	2x DP + DVI	2x DP + DVI	DP + DVI	DP + DVI
Display Support	4	4	4	4	4
Advanced Display	SYNC	SDI, SYNC, Stereo	SDI, SYNC, Stereo	SDI, SYNC, Stereo	SDI, SYNC, tereo
Board Power	120 W	108 W	68 W	45 W	41 W
SLI Support	Yes	Yes	No	No	No
Form Factor	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

Networking

	P310 Tower	P310 SFF
Connector	RJ-45	RJ-45
Controller	Intel 82574L	Intel 82574L

Memory	Integrated Dual 48K configurable transit receive FIFO Buffers	Integrated Dual 48K configurable transit receive FIFO Buffers
Data Rates Supported	10/100/1000 Mbps	10/100/1000 Mbps
Compliance	IEEE 802.1p, Quality of Service (QoS) Support	IEEE 802.1p, Quality of Service (QoS) Support
Bus Architecture	PCI-E 1.1	PCI-E 1.1
Typical Power Consumption	1.9W	1.9W
Operating Temperature	32° to 131° F (0° to 55° C)	32° to 131° F (0° to 55° C)
Storage Humidity	90% at 35°C	90% at 35°C
Dimensions (H x W x D)	12cm x 5.53cm x 11.92cm	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	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	Category-5 up to 100m
Bracket Height	Low Profile & Full Height	Low Profile & Full Height
Max TDP	2.9 W	2.9 W
# of Ports	Single	Dual
System Interface Type	PCIe v2.0 (2.5GT/s)	PCIe v2.0 (2.5GT/s)
Intel® Virtualization Technology for Connectivity (VT-c)	VMDq, VMDc	VMDq, VMDc
Speed & Slot Width	2.5 GT/s, x4 Lane	2.5 GT/s, x4 Lane

Other

OPTICALS	**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 12 VDC – < 600 mA typical, < 1400 mA maximum	5 VDC – <1000 mA typical, < 1600 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.
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 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. Mounting Orientation The Media Card Reader can not be changed and is hard wired into the system Interface Type USB 2.0 (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	Description The Media card reader mounts into our FLEX module which fits into a standared 5.25″ Optical bay 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) Disc Formats xD-H xD-M Micro SD Micro SDHC SD SDHC SDXC Mini SD 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	Windows 7 Professional 32-bit and 64-bit,
Supported	Windows® XP Professional, XP Professional 64-bit.
	Not supported on Linux