

Lenovo P3 Ultra SFF

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Product Name

Product Display Name	ThinkStation P3 Ultra SFF
Information Date	8-Feb-24
Hardware Maintenance Manual	P3 Ultra SFF HMM
Drivers & Software	P3 Ultra SFF Drivers & Software
Available Whitepapers	Power Configurator Memory Configurator Storage Configurator Windows 11/Windows 10 Installation Red Hat Enterprise Linux 9 Installation Ubuntu Linux 22.04 LTS Installation

SECTION I: Platform Overview

Description	The Lenovo ThinkStation P3 Ultra SFF features a revolutionary form factor that is redefining the power of small. With the latest Intel vPro® with up to Intel® Core™ i9 processors and 24 cores, up to NVIDIA RTX™ A5500 mobile graphics, super-fast memory, and cutting-edge storage, this workstation breaks new ground by delivering superior performance and flexibility in a chassis less than four liters in total volume.
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CPU

Processor Support	Intel Raptor Lake Core-S Intel Raptor Lake-S
Socket Type	Socket-V (LGA 1700)

Operating Systems

Preloaded	Windows 11 Pro Windows 11 Home Ubuntu 22.04 LTS
Supported	Red Hat Enterprise Linux 9.x

Memory

Slots	Up to 4 SODIMMs
Channels	Supports up to 4 SODIMM Sockets, 2 Channels
Type	262-pin, 4000MHz ECC/non-ECC SODIMM
ECC Support	Yes
Speed	Up to 4000MHz
Max DIMM Size	32GB DDR5 SODIMM
Max System Memory	128GB
Disclaimers	Memory speed dependent on memory configuration

Storage

Total Bays/Size	1 x 2.5"
SATA	1 x SATA Connectors, Gen 3
PCIe	2 x M.2 PCIe Connector, Gen 4 Onboard

Disclaimers	Additional parts/enclosures may be required for some configurations.
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Video

Integrated Graphics	Intel Integrated UHD Graphics 730 (CPU Dependent) Intel Integrated UHD Graphics 770 (CPU Dependent)
Discrete Graphics	PCIe Add-In-Card, Details in Section Below
Multi-GPU Support	Yes
Type	PCIe Add-In-Card
Bus Interface	PCIe x16

Slots

Slot 1	MXM slot to PCIe 4.0 x16, Half Height, Half Length, 75W
Slot 2	PCIe 3.0 x8 (x4 electrical), Half Height, Half Length, 25W

Front I/O

USB	1 x USB 3.2 Gen 2 Type-A 10Gb/s 2 x Thunderbolt 4 Type-C 40Gb/s
Audio	1 x Combo Audio/Microphone Jack (3.5mm)
Disclaimers	Actual USB throughput will vary depending on the type and quantity of USB devices used. USB-C ports are capable of Display output

Rear I/O

USB	4 x USB 3.2 Gen 2 Type-A 10Gb/s
DisplayPort	3 x Standard (CPU dependent)

Ethernet	1 x 2.5GbE – RJ45 1 x 1GbE – RJ45
Optional USB Adapter	USB 3.2 Gen2x2 Type-C PCIe x4 Adapter – LP 2-ports USB 3.1 Gen2x1 Type-C PCIe x4 Adapter – LP 2-port USB Expansion Card (USB3.0) PCIe x1 – LP 4-Port Serial Expansion Card PCIe x1- LP
Optional Network Adapter	Intel X710-DA2 Dual Port 10-Gigabit Ethernet Adapter (SFP) Intel X550-T2 Dual Port 10-Gigabit Ethernet Adapter Intel I350-T2 Dual Port Gigabit Ethernet Adapter Intel I350-T4 Quad Port Gigabit Ethernet Adapter Broadcom 5720 2-Ports Ethernet Adapter Broadcom 5719 4-Ports Ethernet Adapter Intel AX211 M.2 Wi-Fi Module
Disclaimers	Actual USB throughput will vary depending on the type and quantity of USB devices used.

Ethernet

Vendor	Intel I225 Intel I210
Speeds	10/100/1000/2500Mbps
Functions	PXE, ASF, WOL, Jumbo Frames, Teaming
Connectors	2 x RJ45
Disclaimers	Ethernet speed is port dependent.

Audio

Vendor	Realtek
Type	HD (5.1)
Internal Speaker	Internal 1.5W
Connectors	1 x Front 3.5mm Jack (Mic & Headphone)
Chipset	ALC897Q
Number of Channels	2 Channels (5.1 via driver selection)

Number of Bits/Audio Resolution	6 Channel DAC supports 16/20/24 bit PCM format for 5.1 audio selection 2 Stereo ADC supports 16/20 bit PCM format
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Thermal

Temp Sensors	Ambient Sensor
Fans	1 x CPU Fan 1 x M.2 Fan

Power Specifications

Power Supply	170W	230W	300W
Power Efficiency	90% Efficient @ 50% Load	90% Efficient @ 50% Load	90% Efficient @ 50% Load
Main	20V DC Jack, yellow	20V DC Jack, yellow	20V DC Jack, yellow
Operating Voltage Range	100 – 240V	100 – 240V	100 – 240V
Rated Voltage Range	90-264VAC	90-264VAC	90-264VAC
Rated Line Frequency	47Hz / 63Hz	47Hz / 63Hz	47Hz / 63Hz
Operating Line Frequency Range	50Hz / 60Hz	50Hz / 60Hz	50Hz / 60Hz
Rated Input Current	2.5A	3.5A	4.5A
Power Supply Fan	No	No	No
ENERGY STAR® Qualified (config dependent)	Yes	Yes	Yes
Aux Power Drop	No	No	No

BIOS

Vendor	AMI
Self-Healing BIOS	Yes

Chassis Information

Color	Raven Black
PSU	170W, 230W, and 300W Available, Autosensing
Dimensions	205mm/8.1" H 223mm/8.8" D 87mm/3.4" W
Weight	3.6kg / 7.9lbs
Disclaimers	1. The system dimensions may vary depending on configurations. 2. The system weight is approximate and based on results in Lenovo lab, which varies depending on the source of component, variance of the distribution of each component, and manufacturing process. It may not be the exact weight for each specific model.

Packaging Dimensions

Height (mm/in)	216mm / 8.5"
Width (mm/in)	483mm / 19"
Depth (mm)	295mm / 11.625"
Weight (kgs/lbs)	5.7 kg / 12.5 lbs
Disclaimers	1. The system dimensions may vary depending on configurations. 2. The system weight is approximate and based on results in Lenovo lab, which varies depending on the source of component, variance of the distribution of each weight component, and manufacturing process. It may not be the exact weight for each specific model.

Security & Serviceability

TPM	Infineon SLB9672 TPM 2.0
Asset ID	Yes, 1024 x 8bit
vPro	Intel vPro for WS (AMT 16.x)
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
Access Panel Key Lock	No
Boot Sequence Control	Yes
Padlock Support	Yes
Boot without keyboard and/or mouse	Yes
Access Panel	Tool-less Cover Removal
Optical Drive	No
Hard Drives	Tool-less
Expansion Cards	Retained With Screws
Processor Socket	Tool-less
Color coded User Touch Points	Yes
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Retained With Screws
Restore CD/DVD/USB Set	Not Included, Restore Media Available via Lenovo Customer Support Center

Operating Environment

Air Temperature	Operating: 10°C to 35°C (50°F to 95°F) Non-Operating: -40°C to 60°C (-40°F to 140°F)
Storage	Storage: -40°C to 60°C (-40°F to 140°F) in Original Shipping Carton Storage: -10°C to 65°C (14°F to 149°F) Without Carton
Humidity	Relative Humidity Operating: 10% to 90% (non-condensing) Relative Humidity Storage/Transit: 10% to 90% (non-condensing)
Altitude	Operating: 0m to 3048m (0ft to 10000ft) Storage: 0m to 12192m (0ft to 40000ft)

Vibration	Package Vibration: Three axes in use orientation (X, Y & Z-axis), 1.04Grms, 2-200Hz, 15mins/axis, random, packaged for shipment Operating Vibration: Random Vibration; 5 to 500 Hz, 0.27 G rms; 30 min/axis, X, Y, Z axes Non-Operating Vibration:Random Vibration; 2 to 200 Hz, 1.04 G rms; 15 min/face, 6 faces
Shock	Operation Shock: Half-sine wave, 15G/3ms(X,Y), 30G/3ms(Z) Non-operating Shock: Trapezoidal wave, 45G/11ms
Disclaimers	Extended operating temperatures are possible – please contact your Lenovo Rep

SECTION II: Platform Detail

Board Size	7.24" x 7.69" (184.0mm x 195.5mm)
Layout	Custom

Motherboard Core

Processor Support	Intel Raptor Lake Refresh-S Core Intel Raptor Lake-S Core/Alder Lake-S Core
Socket Type	Socket-V (LGA 1700)
Memory Support	DDR5 up to 4000MHz SODIMM Memory (ECC and non-ECC)
Voltage Regulator	125W TDP Capable
Chipset (PCH)	Intel W680 Chipset
Flash	32MB
Super I/O	Nuvoton NCT6692D
Clock	Intel Native isCLK
Audio	Realtek ALC897Q Codec
Ethernet	Intel I225

Intel I210

Supported Components

Processor Level	Intel Raptor Lake Refresh-S Core Intel Raptor Lake-S Core/Alder Lake-S Core
Processor	i9-14900K i9-14900 i9-14900T i7-14700K i7-14700 i7-14700T i5-14600K i5-14600 i5-14400T i3-14100 i9-13900T i9-13900K i9-13900 i7-13700T i7-13700K i7-13700 i5-13600K i5-13600 i5-13400T i3-13100 i9-12900 i7-12700 i5-12500
Memory Type	ECC/non-ECC SODIMMs – 4000MHz
Memory	16GB DDR5 ECC SODIMM PC4-4000 32GB DDR5 ECC SODIMM PC4-4000 8GB DDR5 non-ECC SODIMM PC4-4000 16GB DDR5 non-ECC SODIMM PC4-4000 32GB DDR5 non-ECC SODIMM PC4-4000
Disclaimers	*Memory speed dependent on memory configuration *14th Gen CPUs require BIOS S0JKT19A and later.

Storage

2.5" SATA Hard Disk Drive (HDD)	1TB SATA HDD 7200rpm, 6Gb/s, 2.5" (FIPS certified) 1TB SATA HDD 7200rpm, 6Gb/s, 2.5" (non-FIPS certified)
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M.2 PCIe Solid State Drive (SSD)	512GB M.2 PCIe SSD, Gen 4 x4, NVMe, OPAL 1024GB M.2 PCIe SSD, Gen 4 x4, NVMe, OPAL 2048GB M.2 PCIe SSD, Gen 4 x4, NVMe, OPAL 4096GB M.2 PCIe SSD, Gen 4 x4, NVMe, OPAL
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RAID

RAID Levels and Requirements	NVMe Drives Support RAID 0/1
Notes	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.

Keyboard and Pointing Devices

Keyboard	Calliope USB Keyboard Traditional USB Keyboard Calliope Wireless Keyboard
Pointing Devices	Calliope USB Mouse Calliope Wireless Mouse

PCIe Adapters

Network	Intel X710-DA2 Dual Port 10-Gigabit Ethernet Adapter (SFP) Intel X550-T2 Dual Port 10-Gigabit Ethernet Adapter Intel I350-T2 Dual Ports Gigabit Ethernet Adapter Intel I350-T4 Quad Ports Gigabit Ethernet Adapter Broadcom 5720 2-Ports Ethernet Adapter Broadcom 5719 4-Ports Ethernet Adapter
USB	USB 3.2 Gen2x2 Type-C PCIe x4 Adapter – LP 2-ports USB 3.1 Gen2x1 Type-C PCIe x4 Adapter – LP 2-Port USB Expansion Card (USB3.0) PCIe x1 – LP 4-Port Serial Expansion Card PCIe x1- LP
WiFi Cards	Intel M.2 WiFi Card with BT – External Antenna Included (Intel AX211 vPro)
Disclaimers	There is an internal front antenna that comes standard in every system.

SECTION III: Supported Component Detail

CPU Specifications Part 1

CPU	Intel Core i9 13900T (1.1GHz / 24C / 32T / 30M / DDR4 3200 / DDR5 5600 / 35W / Turbo / GT32)	Intel Core i9 13900 (2.0GHz / 24C / 32T / 32M / DDR4 3200 / DDR5 5600 / 65W / Turbo / GT32)	Intel Core i9 13900K (3.0GHz / 24C / 32T / 36M / DDR4 3200 / DDR5 5600 / 125W / Turbo / GT32)	Intel Core i7 13700T (1.4GHz / 16C / 24T / 30M / DDR4 3200 / DDR5 5600 / 35W / Turbo / GT32)	Intel Core i7 13700 (2.1GHz / 16C / 24T / 30M / DDR4 3200 / DDR5 5600 / 65W / Turbo / GT32)
# of Cores	24C	24C	24C	16C	16C
# of Threads	32	32	32	24	24
Processor Base Frequency	1.1 GHz	2.0GHz	3.0GHz	1.4GHz	2.1GHz
Max Turbo Frequency	5.3GHz	5.6GHz	5.8GHz	4.9GHz	5.2GHz
Cache	36M	36M	36M	30M	30M
TDP	35W	65W	125W	35W	65W
Disclaimers					

CPU Specifications Part 2

CPU	Intel Core i7 13700K (3.4GHz / 16C / 24T / 30M / DDR4 3200 / DDR5 5600 / 125W / Turbo / GT32)	Intel Core i3 13100 (3.4GHz / 4C / 8T / 12M / DDR4 3200 / DDR5 4800 / 60W / Turbo / GT24)	Intel Core i5 13400T (1.3GHz / 10C / 16T / 20M / DDR4 3200 / DDR5 4800 / 60W / Turbo / GT24)	Intel Core i5 13600 (2.7GHz / 14C / 20T / 24M / DDR4 3200 / DDR5 4800 / 60W / Turbo / GT32)	Intel Core i5 13600K (3.5GHz / 14C / 20T / 20M / DDR4 3200 / DDR5 5600 / 125W / Turbo / GT32)
# of Cores	16c	4C	10C	14C	14C
# of Threads	24	8	16	20	20
Processor Base Frequency	3.4GHz	3.4GHz	1.3GHz	2.7GHz	3.5GHz
Max Turbo Frequency	5.4GHz	4.5GHz	4.4GHz	5.0GHz	5.1GHz
Cache	30M	12M	20M	24M	24M
TDP	125W	60W	35W	65W	125W

CPU Specifications Part 3

CPU	Intel Core i5 12500 (3.0GHz / 6C / 12T / 18M / DDR4 3200 DDR5 4800 / 65W / Turbo / GT32)	Intel Core i7 12700 (2.1GHz / 12C / 20T / 25M / DDR4 3200 DDR5 4800 / 65W / Turbo / GT32)	Intel Core i9 12900 (2.4GHz / 16C / 24T / 30M / DDR4 3200 DDR5 4800 / 65W / Turbo / GT32)	Intel Core i9-14900K Vpro (3GHz / 24C / 32T / 36M / DDR4 3200 DDR5 5600 / 125W / Turbo 3.0 2.0 / GT32)	Intel Core i9-14900 Vpro (2.0GHz / 24C / 32T / 36M / DDR4 3200 DDR5 5600 / 65W / Turbo 3.0 2.0 / GT32)
# of Cores	6c	12c	16c	24c	24c
# of Threads	12	20	24	32	32
Processor Base Frequency	3.0GHz	2.1GHz	2.4GHz	3.0GHz	2.0GHz
Max Turbo Frequency	4.6GHz	4.9GHz	5.1GHz	5.8GHz	5.6GHz
Cache	18M	25M	30M	36M	36M
TDP	65W	65W	65W	125w	65w
Disclaimers					

CPU Specifications Part 4

CPU	Intel Core i9-14900T Vpro (1.1GHz / 24C / 32T / 36M / DDR4 3200 DDR5 5600 / 35W / Turbo 3.0 2.0 / GT32)	Intel Core i7-14700K Vpro (3.4GHz / 20C / 28T / 33M / DDR4 3200 DDR5 5600 / 125W / Turbo 3.0 2.0 / GT32)	Intel Core i7-14700 Vpro (2.1GHz / 20C / 28T / 33M / DDR4 3200 DDR5 5600 / 65W / Turbo 3.0 2.0 / GT32)	Intel Core i7-14700T Vpro (1.3GHz / 20C / 28T / 33M / DDR4 3200 DDR5 5600 / 35W / Turbo 3.0 2.0 / GT32)	Intel Core i5-14600K Vpro (3.5GHz / 14C / 20T / 24M / DDR4 3200 DDR5 5600 / 125W / Turbo 2.0 / GT32)
# of Cores	24c	20c	20c	20c	14c
# of Threads	32	28	28	28	20
Processor Base Frequency	1.1GHz	3.4GHz	2.1GHz	1.3GHz	3.5GHz
Max Turbo Frequency	5.5GHz	5.6GHz	5.4GHz	5.2GHz	5.3GHz
Cache	36M	33M	33M	33M	24M
TDP	35w	125w	65w	35w	125w

CPU Specifications Part 5

CPU	Intel Core i5-14600 Vpro (2.7GHz / 14C / 20T / 24M / DDR4 3200 DDR5 5600 / 65W / Turbo 2.0 / GT32)	Intel Core i5-14400T (1.4GHz / 10C / 20T / 20M / DDR4 3200 DDR5 4800 / 35W / Turbo 2.0 / GT24)	Intel Core i3-14100 (3.5GHz / 4C / 8T / 12M / DDR4 3200 DDR5 4800 / 60W / Turbo 2.0 / GT24)
# of Cores	14c	10c	4c
# of Threads	20	20	8
Processor Base Frequency	2.7GHz	1.4GHz	3.5GHz
Max Turbo Frequency	5.2GHz	4.5GHz	4.7GHz
Cache	24M	20M	12M
TDP	65w	35w	60w
Disclaimers			

HDD Specifications

Drive	1TB SATA 2.5" HDD HDD 7200 rpm, 6Gb/s
3.5" SATA Hard Disk Drive (HDD)	Not Available
2.5" SATA Hard Disk Drive (HDD)	Yes
Connector	SATA
Transfer Rate (Gb/sec)	160MB/s OD Read
Spindle Speed (RPM)	7,200
Power Off to Spindle Stop (sec)	NA
DC Power to Drive Ready (sec)	3.5
Average Latency (msec)	4.2
Input (VDC)	5
Typical (Watts)	1.9
Idle (Watts)	0.7
Physical Dimensions	69.85mm x 100.34mm x 7mm
Weight (grams)	90

Operating (C) Ambient	0 to 60
Operating (C) Base Casting	60
Non-Operating (C) Ambient	(-40 to 70)
Gradient (C per Hour)	20
Operating (Gs @ 2ms)	400
Non-Operating (Gs @ 2ms)	1000

Solid State Storage Specifications

Drive	NVMe 2280 M.2 512GB PCIe SSD (OPAL)	NVMe 2280 M.2 1TB PCIe SSD (OPAL)	NVMe 2280 M.2 2TB PCIe SSD (OPAL)	NVMe 2280 M.2 4TB PCIe SSD (OPAL)	NVMe 2280 M.2 Value 256GB M.2 SSD, NVMe, OPAL, TLC, 2280 Gen4 x4
Dimensions Millimeters (W x D x H)	22 x 80 x 2.38	22 x 80 x 2.38	22 x 80 x 2.38	22 x 80 x 2.38	22 x 80 x 2.38
Interface Type	PCIe Gen 4x4	PCIe Gen 4x4	PCIe Gen 4x4	PCIe Gen 4x4	PCIe Gen 4x4
Power Active (AVG)	5.8W	5.8W	5.8W	?	4.5W
Power Idle	35 mW	35 mW	50mW	50mW	<15mW
Typical Sequential Read	6000 MB/s	6400 MB/s	6400 MB/s	6400 MB/s	4100 MB/s
Typical Sequential Write	3200 MB/s	3800 MB/s	5000 MB/s	5000 MB/s	2200 MB/s
Burst Random Read (4K Queue Depth 32/8 thread);	500K IOPS	550K IOPS	550K IOPS	650K IOPS	500K IOPS
Burst Random Write (4K Queue Depth 32/8 thread)	370K IOPS	400K IOPS	400K IOPS	450K IOPS	480K IOPS
Operating Temperature Range	0 to 55°C	0 to 55°C	0 to 55°C	?	0 to 85°C
Endurance Rating (Lifetime Writes)	150 TB	300 TB	600 TB	?	100TB

Mean Time Between Failures (MTBF)	2.0M POH	2.0M POH	2.0M POH	2.0M POH	2.0M POH
Hardware Encryption	AES 256 bit	AES 256 bit	AES 256 bit	AES 256 bit	AES 256 bit

Integrated Graphics Adapter

Type	Intel® UHD Graphics 770/730
Display Interface	3 x DP 1.2
Video Resolution (max)	4096 x 2160 @ 60Hz (DP)

Discrete Graphics Adapter Part 1

Adapter	Quadro T400 – 4GB GDDR6	Quadro T1000 – 8GB GDDR6	NVIDIA Quadro A2000(DP x4) – 12GB GDDR6	NVIDIA RTX A5500 mobile,16GB, 4miniDP,GD DR6	Nvidia RTX A5000 mobile,16GB, 4miniDP,GD DR6	Nvidia A400(miniDP x4) – 4GB GDDR6 LP	Nvidia A1000(miniDP x4) – 8GB GDDR6 LP	Nvidia RTX 2000 Ada DS (miniDP x4) -16 GB GDDR6 with HP bracket installed and LP bracket loose in box
Bus Interface	PCIe 3.0 x16	PCIe 3.0 x16	PCI Express 4.0x16	PCI Express 4.0x16	PCI Express 4.0x16	PCI Express 4.0x8	PCI Express 4.0x8	PCI Express 4.0x8
Display Interface	3 x mDP 1.4a	4 x mDP 1.4a	4 x mDP 1.4a	4 x mDP 1.4a	4 x mDP 1.4a	4 x mDP 1.4a	Four VESTA mini-DisplayPort connectors	Four VESTA mini-DisplayPort connectors
Graphics Chipset	TU117-850	TU117-875	GP106-850	QN20-E5-R	QN20-E5	PG172 SKU570	PG172 SKU550	PG192 SKU570
Memory Clock Frequency (MHz)	5001MHz	5001MHz	6001MHz	2000MHZ	1750MHZ	Base: 1447 MHz Boost: 1785MHz Maxmum boost: 2100MHz	Base: 727 MHz Boost: 1462 MHz Maxmum boost: 2100MHz	Base: 1620 MHz Boost: 2130 MHz Maxmum boost: 3105 MHz
Memory Size	4GB GDDR6	8GB GDDR6	12GB GDDR6	16GB GDDR6	16GB GDDR6	4GB	8GB	16 GB

Memory Interface	64-bit	128-bit	192-bit	256-bit	256-bit	64 bits	128 bits	128 bits
Memory Bandwidth	Up to 80GB/s	Up to 160GB/s	Up to 288GB/s	Up to 224GB/s	Up to 224GB/s	Up to 96GB/s	Up to 192 GB/s	Up to 224 GB/s
GPU Cores	CUDA Cores: 640	CUDA Cores: 896	???	CUDA Cores: 7424	Coming Soon	768	2304	2816
GPU Core Frequency (MHz)	420MHz (base)/2100MHz (max boost)	1065MHz (base)/2100MHz (max boost)	1493MHz	975MHz	900MHz	1447 MHz	1447 MHz	1620 MHz
Maximum Power Consumption	30W	50W	75w (Board Power)	115w (Board Power)	115w (Board Power)	50W	50W	70W
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or Digital)	7680 x 4320 x 24 bpp @ 120Hz 7680 x 4320 x 24 bpp @ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz	7680 x 4320 x 24 bpp @ 120Hz 7680 x 4320 x 24 bpp @ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz	DP1.4a: 7680*4320*24 bpp/120Hz (Requires two DisplayPort 1.4a links and DSC compression) HDPC: 2.2 7680 x 4320 x 24 bpp @ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz	DP1.4a: 7680*4320*24 bpp/120Hz (Requires two DisplayPort 1.4a links and DSC compression) HDPC: 2.2 7680 x 4320 x 24 bpp @ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz	DP1.4a: 7680*4320*24 bpp/120Hz (Requires two DisplayPort 1.4a links and DSC compression) HDPC: 2.2 7680 x 4320 x 24 bpp @ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz	Maximum pixel clock:Up to 2660 Mpixels per second Maximum raw bandwidth:32.4 Gbps Example of maximum resolutions with CVT-RB timings: 7680 x 4320 x 24 bpp @ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz	Maximum pixel clock:Up to 2660 Mpixels per second Maximum raw bandwidth:32.4 Gbps Example of maximum resolutions with CVT-RB timings: 7680 x 4320 x 24 bpp @ 120Hz 7680 x 4320 x 24 bpp @ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz	Maximum pixel clock:Up to 2660 Mpixels per second Maximum raw bandwidth:32.4 Gbps Example of maximum resolutions with CVT-RB timings: 7680 x 4320 x 24 bpp @ 120Hz 7680 x 4320 x 24 bpp @ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz
Thermal Solution	Ultra-quiet Active Fansink	Ultra-quiet Active Fansink	Active Fansink	Active Fansink	Active Fansink	Active cooled	Active cooled	Active cooled
Dimension	2.713" H x 6.137" L	2.713" H x 6.137" L	6.6 inches, HHHH	3.25" H x 6.732" L	3.25" H x 6.732" L	2.26" H x 5.39" L	2.26" H x 5.39" L	2.26" H x 5.56" L

	Single Slot, Low Profile	Single Slot, Low Profile	double-slot					
Advanced Display	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
SLI/NVLink Support	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available

Discrete Graphics Adapter Part 2

Adapter	NVIDIA RTX A3000 mobile, 12GB, 4miniDP, GDDR6	Nvidia RTX 4000 SFF Ada	Intel Arc Pro A40 Graphics(DG2)
Bus Interface	PCI Express 4.0 x 16	PCI Express 4.0 x 16	PCI Express 4.0 x x8 electrical, x16 mechanical, PCIe* Gen4
Display Interface	4 x mDP 1.4a	4 x mDP 1.4a	4x mDP++ (DP1.4 compliant)
Graphics Chipset	QN20-E1-R	PG192 SKU 550	A40
Memory Clock Frequency (MHz)	1750MHZ	1560MHz	1600MHz
Memory Size	12GB GDDR6	20GB GDDR6	6 GB (3 x 2 GB)
Memory Interface	192bit	160bit	96bit
Memory Bandwidth	Up to 168GB/s	Up to 280GB/s	Video Ram Max: 16Gb/16Gbps
GPU Cores	TBD		TBD
GPU Core Frequency (MHz)	855MHz	720MHz (base)/3105MHz (max boost)	1550MHz
Maximum Power Consumption	80w (Board Power)	70w (Board Power)	50w (Board Power)
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or Digital)	DP1.4a: 7680*4320*24bpp/120Hz (Requires two DisplayPort 1.4a links and DSC compression) HDCP: 2.2 7680 x 4320 x 24 bpp @ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz	DP1.4a: 7680*4320*24bpp/120Hz 7680 x 4320 x 24 bpp @ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz	DP: 5K@120hz / 8k @60hz
Thermal Solution	Active Fansink	Active cooled(blower fan)	Active Fansink
Dimension	3.25" H x 6.732" L	2.71" H x 6.675" L	167.65×68.9×14.31mm
Advanced Display	Not Available	Not Available	Not Available

SLI/NVLink Support	Not Available	Not Available	Not Available
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Ethernet Specifications Group 1 Part 1

Card	Intel I350-T2 Dual Port Gigabit Ethernet Adapter (Stony Lake T2)	Intel I350-T4 Quad Port Gigabit Ethernet Adapter (Stony Lake T4)	2 x 2 AX WiFi with BT (M.2) vPro AX211-TWR/SFF
Supplier PN	I350T2G1P20, MM# 928941	I350T4G1P20, MM# 928942	Coming Soon
Data Rates Supported	10/100/1000Mbps (Copper), 1000Mbps (Fiber)	10/100/1000Mbps (Copper), 1000Mbps (Fiber)	Coming Soon
Controller Details	Intel Ethernet Controller I350	Intel Ethernet Controller I351	Coming Soon
Controller Bus Architecture	PCIe 2.1 (5GT/s)	PCIe 2.1 (5GT/s)	Coming Soon
Data Transfer Mode	Ethernet	Ethernet	Coming Soon
Power Consumption	Copper: I350-T2 V2= 4.4W Fiber: I350-F2= 5.5W	Copper: I350T4V2= 5W LC-Fiber: I350F4= 6W	Coming Soon
IEEE Standards Compliance	IEEE 802.3/10BASE-T, 100BASE-TX, 1000BASE-T	IEEE 802.3/10BASE-T, 100BASE-TX, 1000BASE-T	Coming Soon
Boot ROM Support	PXE boot, Intel iSCSI Remote Boot for Windows, Linux and VMware, Intel BootAgent Software via PXE or BootP, WDMS or UEFI	PXE boot, Intel iSCSI Remote Boot for Windows, Linux and VMware, Intel BootAgent Software via PXE or BootP, WDMS or UEFI	Coming Soon
Network Transfer Mode (Full/Half Duplex)	Supported	Supported	Coming Soon
Network Transfer Rate	1,000Mbps Full Duplex	1,000Mbps Full Duplex	Coming Soon
Operating System Driver Support	Windows 7/8/10, Linux, Free BSD, XEN, VMware	Windows 7/8/10, Linux, Free BSD, XEN, VMware	Coming Soon
Manageability	Supported	Supported	Coming Soon
Manageability Capabilities Alerting	Supported	Supported	Coming Soon
TDP	Firmware Based Thermal Management	Firmware Based Thermal Management	Coming Soon
Operating Temperature Range	0°C to 55°C (32°F to 131°F)	0°C to 55°C (32°F to 131°F)	Coming Soon
# of Ports	2	4	Coming Soon

Data Rate Per Port	10/100/1000Mbps (copper), 1000Mbps (fiber)	10/100/1000Mbps (copper), 1000Mbps (fiber)	Coming Soon
System Interface Type	PCIe Gen 2.1	PCIe Gen 2.1	Coming Soon
NC Sideband Interface	Not Available	Not Available	Coming Soon
Jumbo Frames Supported	Yes	Yes	Coming Soon
1000Base-T	Yes	Yes	Coming Soon
IEEE 1588	Supported	Supported	Coming Soon
Supported Under vPro	Not Available	Not Available	Coming Soon
Disclaimers			

Ethernet Specifications Group 1 Part 2

Model	i350-T2	i350-T4	2 x 2 AX WiFi with BT (M.2) vPro AX211-TWR/SFF
Connector	2 x Ports RJ-45 Copper	4 x Ports RJ-45 Copper	Coming Soon
Website	i350 T2	i350 T4	Coming Soon
Auto-Negotiation	IEEE* 802.3* Auto-negotiaton	IEEE* 802.3* Auto-negotiaton	Coming Soon
Intel® vPro™	Not Available	Not Available	Coming Soon
Intel® Standard Manageability	Supported	Supported	Coming Soon
Power Optimizer Platform Low-power Management Systems	Supported	Supported	Coming Soon
Energy Efficient Ethernet	Supported	Supported	Coming Soon
TCP/UDP Checksum and Segmentation Offload (IPv4 and IPv6)	Supported	Supported	Coming Soon
Receive Side Scaling	Supported	Supported	Coming Soon
Dual Tx and Rx Queues	Yes	Yes	Coming Soon
Jumbo Frames (up to 9KB)	Supported	Supported	Coming Soon
Teaming	Supported	Supported	Coming Soon
Wake from Deep Sx	Supported	Supported	Coming Soon

Server Operating System Support	Windows Server 2008, 2012, 2016, 2019 Linux (RHEL/SLES), Free BSD, Xen, Vmware	Windows Server 2008, 2012, 2016, 2019 Linux (RHEL/SLES), Free BSD, Xen, Vmware	Coming Soon
Network Proxy/ARP Support	Supported	Supported	Coming Soon

Ethernet Specifications Group 2 Part 1

Card	Intel X550-T2 Dual Port Gigabit Ethernet Adapter (sagepond T2)
Supplier PN	X550T2G1P5, MM#940263
Data Rates Supported	10 Gigabits per second
Controller Details	dual-port Intel® X550 10 GbE
Controller Bus Architecture	PCIe3.0 x4
Data Transfer Mode	Ethernet
Power Consumption	12.13w
IEEE Standards Compliance	10GBASE-T 10GBASE-T is the specification for 10 Gb/s Ethernet over twisted pair cables as defined in IEEE 802.3an standard 1000BASE-T 1000BASE-T is the specification for 1 Gb/s Ethernet over twisted pair cables as defined in IEEE 802.3-2005 100BASE-TX 100BASE-T is the specification for 100 Mb/s Ethernet over twisted pair cables as defined in IEEE 802.3-2005
Boot ROM Support	PXE boot, Intel iSCSI Remote Boot for Windows, Linux and Vmware, Intel BootAgent Software via PXE or BootP, WDMS or UEFI
Network Transfer Mode (Full/Half Duplex)	Supported
Network Transfer Rate	10gbps Full Duplex
Operating System Driver Support	Windows 10/11, Linux
Manageability	Supported
Manageability Capabilities Alerting	Supported
TDP	Thermal Design Power
Operating Temperature Range	Refer to CC172 Tier 4 (graphic that follows)

# of Ports	2
Data Rate Per Port	100M,1G,10G
System Interface Type	PCIe Gen 3.0
NC Sideband Interface	Not Available
Jumbo Frames Supported	Yes
1000Base-T	Yes
IEEE 1588	Supported
Supported Under vPro	Not Available
Disclaimers	

Ethernet Specifications Group 2 Part 2

Model	X550-T2
Connector	2 x Ports RJ-45 Copper
Website	X550-T2
10BASE-T (IEEE 802.3 specification conformance)	Not
100BASE-TX (IEEE 802.3 specification conformance)	Support
1000BASE-T (IEEE 802.3 specification conformance)	Support
Auto-Negotiation	IEEE* 802.3* Auto-negotiaton
Intel® vPro™	Not Available
Intel® Standard Manageability	Not
Energy Efficient Ethernet	Supported
TCP/UDP Checksum and Segmentation Offload (IPv4 and IPv6)	Supported
Receive Side Scaling	Supported
Dual Tx and Rx Queues	Yes
Jumbo Frames (up to 9KB)	Supported
Teaming	Supported

Timing and Synchronization	Not
Wake from Deep Sx	N/A
Server Operating System Support	Windows Server 2008, 2012, 2016, 2019 Linux (RHEL/SLES), Free BSD, Xen, Vmware
Network Proxy/ARP Support	Supported
Disclaimers	

SECTION IV: BIOS / Certifications / Standards / Environmental

BIOS Specifications

WMI Support	Compliant with Microsoft WBEM and the DMTF common information model
ROM-Based Setup Utility (F1)	System configuration setup program (text/graphic interface) available at power-on with F1 key
Bootblock Recovery	Recovers system BIOS if the flash ROM is corrupted
Replicated Setup	Saves system configuration settings to a file that can then be used to replicate the settings 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 the event of a decrease in system memory
Thermal Alert	Power-on error message in the event of a fan failure
Asset Tag	Supports ability to set SMBIOS type 2 baseboard asset tag field
System/Emergency ROM Flash Recovery with Video	Supports process to recover the system BIOS if the flash ROM is corrupted
Remote Wakeup/Remote Shutdown	System admin can power on/off a client computer from a remote location to provide maintenance
Quick Resume Time	Supports 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	Offers multiple settings for fan control ranging between better performance and better acoustics
Security	Supervisor, user and power-on passwords can protect boot and ROM-based setup <ul style="list-style-type: none"> - Chassis Intrusion Detection - UEFI Secure Boot Support - HDD Password Can Protect HDD Data - Windows UEFI Firmware Update Support - Device Guard Support - BIOS Guard, Boot Guard Support
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 based attacks
Memory Modes	Supports mirroring, lock step, and sparing memory modes
Windows 10 Ready	Supports Windows 10 requirements for secure flash, UEFI v 2.7 device guard support spec

Industry Standard Specification Support

UEFI	Unified Extensible Firmware Interface v2.7
ACPI (Advanced Configuration and power Management Interface)	Advanced Configuration and Power Interface v6.2
ASF 2.0	DMTF Alert Standard Format Specification v2.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6)
CD Boot	EI Torito Bootable CD-Rom Format Specification, v1.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision v1.0
PCI	PCI Local Bus v3.0 PC Firmware Specification 3.1
PCI Express	PCI Express Base Specification v4.0
SATA	Serial ATA Revision 3.0 Specification
TPM	Trusted Computing Group TPM Specification v2.0

UHCI	Universal Host Controller Interface Design Guide, Revision v1.1
USB	Universal Serial Bus Revision v1.1 Universal Serial Bus v2.0 Universal Serial Bus v3.0 Universal Serial Bus v3.2
SMBIOS	DMTF System Management Spec v3.2.1
XHCI	XHCI SPEC Revision v1.2

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	<ul style="list-style-type: none"> · 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/cm²/week <p>REACH Article 33 information about substances in articles is available at: https://www.lenovo.com/us/en/social_responsibility/social_responsibility_resources/</p>
Batteries	UN38.3,MSDS
Safety, EMC Connection to the Telephone Network and Labeling	Not applicable

Acoustic Noise Emissions Declaration

LWAd(bels) Idle	3.1
LWAd(bels) Oper	3.7

Safety, EMC Connection to the Telephone Network and Labeling

Industry Standard Specifications	not applicable
Remote Manageability Software Solutions	not applicable
System Software Manager	Lenovo ThinkStation supports software management tools by Lenovo Vantage.

Regulations & Standards

EMC & Safety	FCC/IC VCCI BSMI KC RCM TUV-GS cTUVus IEC60950-1&IEC62368 CB Report/Certificate Saudi Arabia EQM Kuwait KUCAS China CCC Mark South Africa SABS Russia/Belarus/Kazakhstan/Kyrgyzstan/Armenia-EAC Morocco-CM Mexico-NOM Serbia KVALITET Ukraine UKrCEPRO India-BIS China SRRC Indonesia-SDPPI Malaysia-SIRIM Philippines-NTC
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Environmentals

Energy Star	ENERGY STAR 8.0
EPEAT	EPEAT Certification Available on Select Models
ErP Lot-3 2013	Yes
Hazardous Substances	<ul style="list-style-type: none"> · 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

	<ul style="list-style-type: none"> · 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/cm²/week
Materials Used	<p>System</p> <p>85% PCC recycled plastic in Front, Rear Bezel</p> <p>35% PCC recycled plastic inside chassis</p> <p>Packaging</p> <p>Carton: 90% Recycled and/or FSC certified content³</p> <p>Cushion: 90% Recycled EPE</p>
TCO Certification	9.0
Disclaimers	EPEAT registered where applicable. EPEAT registration varies by country. See www.epeat.net for registration status by country.