

Lenovo P3 Tower

Version: 6.0 | 05/29/2024

Product Name	P3 Tower
Product Display Name	ThinkStation P3 Tower
Information Date	8-Feb-24
Hardware Maintenance Manual	P3 Tower HMM
Drivers & Software	P3 Tower 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	Experience the power of a workstation at the price of a desktop with the Lenovo ThinkStation P3 Tower. Offering Intel vPro® with up to Intel® Core™ i9 processors and 24 cores and up to NVIDIA RTX™ 5000 Ada graphics, the P3 Tower is built for mission-critical tasks that require superior reliability and performance, providing the value you need without compromising on compute power.
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CPU

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

Operating Systems

Preloaded	Windows 11 Pro Windows 11 Home Ubuntu 22.04 LTS
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Supported	Red Hat Enterprise Linux 9.1
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Memory

Slots	Up to 4 DIMMs
Channels	Supports up to 4 DIMM Sockets, 2 Channels
Type	DDR5 ECC and non-ECC UDIMM
ECC Support	Yes, CPU Dependent
Speed	Up to 4400MHz
Max DIMM Size	32GB DDR5 UDIMM
Max System Memory	128GB
Disclaimers	*Memory speed impacted by number and type of DIMMs installed. *Memory speed can be dependent on the individual CPU capabilities.

Storage

Total Bays/Size	Up to 4 x 3.5"
SATA	3 x SATA Connectors, Gen 3
PCIe	2 x M.2 2240/2280/22110 PCIe Connector, Gen 4 Onboard Additional M.2 2280 NVMe Drive Supported by Single Adapter, Gen 3
eSATA	1 x eSATA Connector, Gen 3
Disclaimers	A configuration with four (4) 3.5" HDDs will block both onboard M.2 drive connectors. Additional parts/enclosures may be required for some configurations. Refer to storage whitepaper for more details.

Video

Integrated Graphics	Intel Integrated UHD Graphics 770 (CPU dependent) Intel Integrated UHD Graphics 730 (CPU dependent)
Discrete Graphics	PCIe Add-In-Card, Details in Section 3 Below
Multi-GPU Support	Yes
Type	PCIe Add-In-Card
Bus Interface	PCIe x16

Slots

Slot 1	PCIe 4.0 x16, Full Height, Full Length, 75W, With Latch
Slot 2	PCIe 3.0 x1, Full Height, Full Length, 25W
Slot 3	PCIe 4.0 x4, Full Height, Half Length, 25W, With Latch
Slot 4	PCIe 3.0 x1, Full Height, Half Length, 25W

Disclaimers

PCIe Slot 3 is a x16 mechanical slot, x4 electrical slot.

Front I/O

USB	2 x USB-A 3.2 Gen 2 (10Gb/s) 2 x USB-A 3.2 Gen 1 (5Gb/s) 1 x USB-C 3.2 Gen 2 (10Gb/s)
Audio	1 x Headphone Jack (3.5mm) 1 x Microphone Jack (3.5mm)
Media Card Reader	Optional: Front 3-in-1 Media Card Reader (USB 2.0)
Flex Bay	One 3.5" Flex Bay, Supports one of the following: – Flex storage enclosure – Front-access storage enclosure
Disclaimers	Actual USB throughput will vary depending on the type and quantity of USB devices used.

Rear I/O

USB	4 x USB-A 3.2 Gen 1 (5Gb/s)
Audio	1 x Line Out
DisplayPort	2 x Standard DP 1.4 Optional 1 x DP 1.2 (CPU dependent), via flexible I/O port card
HDMI	1 x Standard HDMI 2.0 Optional 1 x HDMI 1.4 (CPU dependent), via flexible I/O port card
Type-C	Optional 1 x USB-C 3.1 Gen 1 (CPU dependent), via flexible I/O port card
VGA Port	Optional 1 x VGA Port (CPU dependent), via flexible I/O port card
Serial Port	Optional 1 x Serial Port
Ethernet	1 x 1GbE – RJ45
PS/2	Optional PS/2 (2 Port)
Optional USB Adapter	Rear USB-C 3.2 Gen 2 PCIe x4 Adapter 2-Port USB 3.0 Adapter
Optional Network Adapter	Bitland RTL8168H Single Port Gigabit Ethernet Adapter Intel I210-T1 Single Port Gigabit Ethernet Adapter Intel I350-T2 Dual Port Gigabit Ethernet Adapter Broadcom 5720 Dual Port Gigabit Ethernet Adapter Broadcom 5719 Quad Port Gigabit Ethernet Adapter Intel PCIe WiFi Card With BT External Antenna Kit (AX211)
Disclaimers	Actual USB throughput will vary depending on the type and quantity of USB devices used.

Ethernet

Vendor	Intel Jacksonville I219-LM (w/ AMT 16.x)
Speeds	10/100/1000 Mbps
Functions	PXE, ASF, WOL, Jumbo Frames, Teaming

Connectors	1 x RJ45
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Audio

Vendor	Realtek
Type	Integrated Audio
Internal Speaker	Yes, 2W (8 ohms)
Connectors	2 x Front 3.5mm Jacks (Microphone & Headphone) 1 x Rear 3.5mm Jack (Line Out)
Chipset	ALC897Q-CG
Number of Channels	2
Number of Bits/Audio Resolution	2 channels of DAC support 16/20/24-bit PCM format

Thermal

Temp Sensors	Ambient Sensor
Fans	1 x CPU Fan 1 x Front Fan 1 x Rear Fan 2 x Side Panel Fans (optional) 1 x Power Supply Fan (inside PSU)

Power Specifications

Power Supply	1100W	750W	500W
Power Efficiency	92% Efficient @ 50% Load	92% Efficient @ 50% Load	92% Efficient @ 50% Load
Main	C14	C14	C14
Operating Voltage Range	100 – 240V	100 – 240V	100 – 240V
Rated Voltage Range	90-264VAC	90-264VAC	90-264VAC
Rated Line Frequency	50Hz / 60Hz	47Hz / 63Hz	47Hz / 63Hz
Operating Line Frequency Range	50Hz / 60Hz	50Hz / 60Hz	50Hz / 60Hz
Rated Input Current	15A	10A	7A
Graphics	1 x 12VHPWR (16-pin)	1 x 8 pin (6+2)	1 x 8 pin (6+2)
Power Supply Fan	Yes	Yes	Yes
ENERGY STAR® Qualified (config dependent)	Yes	Yes	Yes
80 PLUS Compliant	Yes	Yes	Yes
Built-in Self Test (BIST) LED	No	No	No
Aux Power Drop	Yes	Yes	Yes

BIOS

Vendor	AMI
Self-Healing BIOS	Yes

Chassis Information

Color	Raven Black
PSU	1100W, 750W and 500W Available, Autosensing, 80 PLUS Platinum Qualified for 1100w, 750w and 500w
Dimensions	415mm/16.34" H 370mm/14.57" D 180mm/7.09" W
Weight	8.65 kg / 19.07 lbs (starting weight) 13.61 kg / 30.00 lbs (maximum configuration)

Packaging Dimensions

Height (mm/in)	570mm / 22.44"
Width (mm/in)	315mm / 12.40"
Depth (mm)	500mm / 19.69"
Weight (kgs/lbs)	16.54 kg / 36.46 lbs

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 Side Cover Removal
Optical Drive	N/A

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	Retained With Screws
Restore CD/DVD/USB Set	Not Included, Restore Media Available via Lenovo Customer Support Center

Operating Environment

Air Temperature	Operating: 5°C to 40°C (41°F to 104°F) Non-Operating: -10°C to 65°C (14°F to 149°F)
Storage	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 90% (Humidity+EELP)
Altitude	Operating: -15.2m to 3048m (-50ft to 10000ft) Storage: -15.2m to 10668m (-50ft to 35000ft)
Vibration	Package Vibration: Random,1.04G at 2-200 Hz, 15 Minutes XYZ 6 faces Operating Vibration: Random,0.27G at 5-500 Hz, 30 Minutes Per Surface (X,Y,Z) Non-Operating Vibration: Random,1.04G at 2-200 Hz, 15 Minutes Per Surface (±X,±Y,±Z)
Shock	Operating Shock: Half-sine wave, 15G/3ms(X,Y), 30G/3ms(Z) Rack Operating Shock: Half-sine wave, 15G/5ms Non-operating Shock: Trapezoidal wave, 45G/11ms
Disclaimers	Extended operating temperatures are possible – please contact your Lenovo Rep

SECTION II: Platform Detail

Board Size	10.51" x 9.72" (267mm x 247mm)
Layout	Custom ATX

Motherboard Core

Processor Support	Intel Raptor Lake Refresh Core Series Intel Raptor Lake Core Series
Socket Type	Socket-V (LGA 1700)
Memory Support	DDR5 up to 4400MHz UDIMM Memory (ECC or non-ECC)

Voltage Regulator	125W TDP Capable
Chipset (PCH)	Intel W680 Chipset
Flash	2 x 32MB
Super I/O	Nuvoton NCT6692D
Clock	Intel Native isCLK
Audio	Realtek ALC897Q-CG Codec
Ethernet	Intel Jacksonville I219LM

Supported Components

Processor Level	Intel Raptor Lake Refresh – Core Intel Raptor Lake – Core
Processor	i9-14900K i9-14900 i7-14700K i7-14700 i5-14600K i5-14600 i5-14500 i5-14400 i3-14100 i9-13900K i9-13900 i7-13700K i7-13700 i5-13600K i5-13600 i5-13500 i5-13400 i3-13100
Memory Type	ECC/non-ECC UDIMMs – 4400MHz
Memory	16GB DDR5 ECC UDIMM PC4-4400 32GB DDR5 ECC UDIMM PC4-4400 8GB DDR5 non-ECC UDIMM PC4-4400 16GB DDR5 non-ECC UDIMM PC4-4400 32GB DDR5 non-ECC UDIMM PC4-4400
Disclaimers	*Memory speed dependent on CPU support. *14th Gen CPUs require BIOS S01KT5EA and later.

Storage

3.5" SATA Hard Disk Drive (HDD)	1TB SATA HDD 7200rpm, 6Gb/s, 3.5" 2TB SATA HDD 7200rpm, 6Gb/s, 3.5" 4TB SATA HDD 7200rpm, 6Gb/s, 3.5" (enterprise class) 6TB SATA HDD 7200rpm, 6Gb/s, 3.5" (enterprise class)
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)
M.2 PCIe Solid State Drive (SSD)	256GB M.2 PCIe SSD, Gen 4 x4, NVMe, OPAL 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

RAID

RAID Levels and Requirements	NVMe Drives Support RAID 0/1 SATA Drives Support RAID 0/1/5/10
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.

Optical Drive/Removable Media

DVD-ROM Drive	Slim DVD-ROM drive
DVD Burner/CD-RW Drive	Slim DVD Burner/CD-RW Drive
Blu-Ray Burner Drive	Slim Blu-Ray ODD DVD Burner
Media Card Reader Specifications	Optional Front 3-in-1 USB 2.0 Media Card Reader
Disclaimers	ODD only supported on certain models/chassis. For more information refer to the P3 Tower Storage Whitepaper.

Keyboard and Pointing Devices

Keyboard	Calliope USB Keyboard Traditional USB Keyboard Traditional PS/2 Keyboard
Pointing Devices	Calliope USB Mouse PS/2 Optical Mouse

PCIe Adapters

Network	Aquantia PCIe4 10GbE AQN-107 Gigabit Ethernet Adapter Bitland RTL8168H Single Port Gigabit Ethernet Adapter Intel I210-T1 Single Port Gigabit Ethernet Adapter Intel I350-T2 Dual Port Gigabit Ethernet Adapter Broadcom 5720 Dual Port Gigabit Ethernet Adapter Broadcom 5719 Quad Port Gigabit Ethernet Adapter
Thunderbolt	Rear Thunderbolt PCIe Adapter
USB	USB-C 3.2 Gen 2 PCIe x4 Adapter (Dual Port) USB 3.0 PCIe x1 Adapter (Dual Port)
WiFi Cards	Intel PCIe WiFi Card With BT External Antenna Kit (AX211)
Serial Card	4-Port Serial Expansion Card
PCIe to M.2 Adapter Card	PCIe x4 to M.2 Adapter

SECTION III: Supported Component Detail

CPU Specifications Group 1

CPU	Intel Core i9-13900K	Intel Core i7-13700K	Intel Core i5-13600K	Intel C
# of Cores	24c	16c	14c	24c
# of Threads	32	24	20	32
Processor Base Frequency	3.0GHz	3.4GHz	3.5Ghz	2.0GH
Max Turbo Frequency	5.8GHz	5.4GHz	5.1Ghz	5.6GH:
Cache	36	30M	24M	36M
TDP	125W	125W	125W	65W

CPU Specifications Group 2

CPU	Intel Core i5-13600	Intel Core i5-13500	Intel Core i5-13400	Intel C
# of Cores	14c	14c	10c	4c
# of Threads	20	20	16	8
Processor Base Frequency	2.7GHz	2.5GHz	2.5GHz	3.4GH
Max Turbo Frequency	5.0GHz	4.8GHz	4.6GHz	4.5GH
Cache	24M	24M	20M	12M
TDP	65W	65W	65W	65W

CPU Specifications Group 3

CPU	Intel Core i9-14900K	Intel Core i7-14700K	Intel Core i5-14600K	Intel C
# of Cores	24	20	14	24
# of Threads	32	28	20	32
Processor Base Frequency	6GHz	5.6GHz	5.3Ghz	5.8GH
Max Turbo Frequency	3.2GHz	3.4GHz	3.5Ghz	2GHz
Cache	36M	33M	24M	36M
TDP	125W	125W	125W	65W

CPU Specifications Group 4

CPU	Intel Core i5-14600	Intel Core i5-14500	Intel Core i5-14400	Intel Co
# of Cores	14	14	10	4

# of Threads	20	20	16	8
Processor Base Frequency	5.2GHz	5GHz	4.7GHz	4.7GHz
Max Turbo Frequency	2.7GHz	2.6GHz	2.5GHz	3.5GHz
Cache	24M	24M	20M	12M
TDP	65W	65W	65W	60W

HDD Specifications

Drive	1TB SATA – 7200rpm, 6Gb/s, 2.5"	1TB SATA – 7200rpm, 6Gb/s, 3.5"	2TB SATA – 7200rpm, 6Gb/s, 3.5"	2TB SATA – 7200rpm, 6Gb/s, 3.5" Enterprise
3.5" SATA Hard Disk Drive (HDD)	Not Available	Yes	Yes	Yes
2.5" SATA Hard Disk Drive (HDD)	Yes	Not Available	Not Available	Not Available
Connector	SATA	SATA	SATA	SATA
Transfer Rate (Gb/sec)	160MB/s OD Read	Average Data Rate, Read/Write 156MB/s	Average Data Rate, Read/Write 156MB/s	Sustained Transfer Rate 215MB/s
Spindle Speed (RPM)	7,200	7,200	7,200	7200
Power Off to Spindle Stop (sec)	NA	NA	NA	NA
DC Power to Drive Ready (sec)	3.5	<10.0	<17.0	23(typ)
Average Latency (msec)	4.2	4.16	4.16	4.16
Input (VDC)	5	5	5	12/5
Typical (Watts)	1.9	6.19	6.7	9.19
Idle (Watts)	0.7	4.6	4.5	4.94
Physical Dimensions	69.85mm x 100.34mm x 7mm	101.6mm x 146.99mm x 19.88mm	101.6mm x 146.99mm x 26.1mm	101.6mm x 146.99mm x 26.1mm
Weight (grams)	90	420	535	620
Operating (C) Ambient	0 to 60	0 to 60	0 to 60	5 to 60
Operating (C) Base Casting	60	60	60	60
Non-Operating (C) Ambient	(-40 to 70)	(-40 to 70)	(-40 to 70)	(-40 to 70)
Gradient (C per Hour)	20	20	20	20
Operating (Gs @ 2ms)	400	70	80	Read/Write 40 Gs
Non-Operating (Gs @ 2ms)	1000	350	300	300 Gs

HDD Specifications

Drive	6TB SATA – 7200rpm, 6Gb/s, 3.5" Enterprise
3.5" SATA Hard Disk Drive (HDD)	Yes

2.5" SATA Hard Disk Drive (HDD)	Not Available
Connector	SATA
Transfer Rate (Gb/sec)	Sustained Data Transfer Rate 216-226MB/s
Spindle Speed (RPM)	7,200
Power Off to Spindle Stop (sec)	NA
DC Power to Drive Ready (sec)	<17.0
Average Latency (msec)	4.16
Input (VDC)	5
Typical (Watts)	1318
Idle (Watts)	6.21
Physical Dimensions	101.85mm x 147mm x 26.1mm
Weight (grams)	716
Operating (C) Ambient	5 to 60
Operating (C) Base Casting	60
Non-Operating (C) Ambient	(-40 to 70)
Gradient (C per Hour)	20
Operating (Gs @ 2ms)	Read 70 Gs / Write 40 Gs
Non-Operating (Gs @ 2ms)	250

Solid State Storage Specifications

Drive	NVMe 2280 M.2 Value 256GB M.2 NVMe OPAL	NVMe 2280 M.2 512GB PCIe SSD (OPAL)	NVMe 2280 M.2 1TB PCIe SSD (OPAL)	NVMe 2TB PCIe SSD (OPAL)
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
Interface Type	PCIe Gen 4x4	PCIe Gen 4x4	PCIe Gen 4x4	PCIe Gen 4x4
Power Active (AVG)	5.9W	5.8W	8W	8.25W
Power Idle	100 mW	35 mW	35 mW	25mW
Typical Sequential Read	3100 MB/s	6000 MB/s	6900 MB/s	6900 MB/s
Typical Sequential Write	1400 MB/s	3200 MB/s	4800 MB/s	4800 MB/s
Burst Random Read (4K Queue Depth 32/8 thread);	330K IOPS	500K IOPS	820K IOPS	800K IOPS
Burst Random Write (4K Queue Depth 32/8 thread)	280K IOPS	370K IOPS	650K IOPS	650K IOPS
Operating Temperature Range	0 to 55°C	0 to 55°C	0 to 55°C	0 to 55°C
Endurance Rating (Lifetime Writes)	150 TB	150 TB	300 TB	600 TB
Mean Time Between Failures (MTBF)	1.5M POH	2.0M POH	2.0M POH	2.0M POH

Hardware Encryption

AES 256 bit

AES 256 bit

AES 256 bit

AES 256 bit

Optical Drive Specifications

Description	9mm Slim DVD ROM Drive (SATA)	9mm Slim DVD Burner/CD-RW Drive (SATA)	9mm Slim Blu-Ray ODD DVD Burner (SATA)
Interface Type	SATA 1.5 Gb/s	SATA 1.5 Gb/s	SATA 1.5 Gb/s
Dimensions	128±0.4×9.0 ±0.4×127±0.4(Max) Unit:mm (Without Bezel-W x H x D)	128±0.4×9.0 ±0.4×127±0.4(Max) Unit:mm (Without Bezel-W x H x D)	128±0.4×9.0 ±0.4×127±0.4(Max) Unit:mm (Without Bezel-W x H x D)
Disc Capacity	NA	NA	NA
Type	DVDROM	DVDWriter	BD Rambo
External Dimensions	NA	NA	NA
Speed	NA	NA	NA
Bay Type	9.0mm Tray	9.0mm Tray	9.0mm Tray
Color	Business Black or without bezel	Business Black or without bezel	Business Black or without bezel
Removable	No	No	No
Internal Buffer Size	0.5MB Min	0.5MB Min	4MB
Writes	NA	8XDVD+R / 8XDVD+RW / 6XDVD+R DL 8XDVD-R / 6XDVD-RW / 6XDVD-R DL 24XCD-R / 16XCD-RW	6x BD-R / 2x BD-RE 8XDVD+R / 8XDVD+RW / 6XDVD+R DL 8XDVD-R / 6XDVD-RW / 6XDVD-R DL 5XDVD-RAM 24XCD-R / 16XCD-RW
Reads	8XDVD-ROM / 24XCD-ROM	8XDVD-ROM / 24XCD-ROM	6x BD-ROM / 8x DVD-ROM / 5x DVD-RAM / 24x CD-ROM
Source	DC Power 5V	DC Power 5V	DC Power 5V
DC Power Requirements	+5V±5%	+5V±5%	+5V±5% Ripple less than 100mVp-p
DC Current	Max 2.5A@5v	Max 2.5A@5v	Max 2A@5v
Operating Systems Supported	Windows OS/Linux	Windows OS/Linux	Windows OS/Linux
Temperature	Operating: 5°C to 45 °C Non-Operating:-30°C to 60°C	Operating: 5°C to 45 °C Non-Operating:-30°C to 60°C	Operating: 5°C to 45 °C Non-Operating:-30°C to 60°C
Relative Humidity	Operating > Read: 15 % to 85 % (Non-Condensing) Write 15 % to 80 % (Depend on the Temperature) Storage/Transportation > 10 % to 80 % (Non-Condensing)	Operating > Read: 15 % to 85 % (Non-Condensing) Write 15 % to 80 % (Depend on the Temperature) Storage/Transportation > 10 % to 80 % (Non-Condensing)	Operating > Read: 15 % to 85 % (Non-Condensing) Write 15 % to 80 % (Depend on the Temperature) Storage/Transportation > 10 % to 80 % (Non-Condensing)

Integrated Graphics Adapter

Type	Intel® UHD Graphics770/730
Bus Interface	Processor onboard
Display Interface	DP/DP/HDMI/DP or HDMI or Type-C or VGA(1 of 4 optional)
Video Resolution (max)	8K60 or 5K60 HDR max(2* 5K60 HDR or 4* 4K60 HDR)

Discrete Graphics Adapter Group 1

Adapter	Quadro T400 – 4GB GDDR6	Quadro T1000 – 8GB GDDR6	NVIDIA RTX A2000(DP x4) – 12GB GDDR6	NVIDIA RTX A5000 – 48GB GDDR6
Bus Interface	PCIe 3.0 x16	PCIe 3.0 x16	PCI Express 4.0x16	PCIe 4.0 x16
Display Interface	3 x mDP 1.4a	4 x mDP 1.4a	4 x mDP 1.4a	4 x DP 1.4a
Graphics Chipset	TU117-850	TU117-875	GP106-850	GA104
Memory Clock Frequency (MHz)	5001MHz	5001MHz	6001MHz	7000MHz
Memory Size	4GB GDDR6	8GB GDDR6	12GB GDDR6	16GB GDDR6
Memory Interface	64-bit	128-bit	192-bit	256-bit
Memory Bandwidth	Up to 80GB/s	Up to 160GB/s	Up to 288GB/s	Up to 384GB/s
GPU Cores	CUDA Cores: 384	CUDA Cores: 896	N/A	Comir
GPU Core Frequency (MHz)	420MHz (base)/2100MHz (max boost)	1065MHz (base)/2100MHz (max boost)	1493MHz	2100MHz
Maximum Power Consumption	30W	50W	70W	140W
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*24bpp/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	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
Dimension	2.713" H x 6.137" L Single Slot, Low Profile	2.713" H x 6.137" L Single Slot, Low Profile	6.6 inches, HHHL double-slot	4.4" H Single
Advanced Display	Not Available	Not Available	Not Available	Not Available
SLI/NVLink Support	Not Available	Not Available	Not Available	NVLink

Discrete Graphics Adapter Group 1

Adapter	NVIDIA RTX A5500	NVIDIA RTX5000 Ada	NVIDIA RTX4500 Ada	NVIDIA RTX4500 Ada
Bus Interface	PCI Express 4.0x16	PCI Express 4.0x16	PCIe 4.0 x16	PCIe 4.0 x16
Display Interface	DP *4	DP * 4	DP * 4	DP * 4
Graphics Chipset	GA102-860	PG132 SKU 550	PG132 SKU 560	PG132 SKU 560
Memory Clock Frequency (MHz)	8001MHz	9000Mhz (max)	9000Mhz (max)	9000Mhz (max)
Memory Size	24GB DDR6	32GB	24GB	20GB
Memory Interface	384-bit	GDDR6	GDDR6	GDDR6
Memory Bandwidth	Coming Soon	Up to 576GB/s	Up to 432GB/s	Up to 432GB/s
GPU Cores	Coming Soon	Coming Soon	Coming Soon	Coming Soon
GPU Core Frequency (MHz)	1080MHz (base)/2100MHz (max boost)	Base: 1155MHz/ Boost:2550MHz	Base: 2070MHz/ Boost:2580MHz	Base: 2070MHz/ Boost:2580MHz
Maximum Power Consumption	230W	250W	210W	130W
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 at 120Hz 7680 x 4320 x 36 bpp at 60Hz	7680 x 4320 x 24 bpp at 120Hz 7680 x 4320 x 36 bpp at 60Hz	7680 x 4320 x 24 bpp at 120Hz 7680 x 4320 x 36 bpp at 60Hz
Thermal Solution	Active Fansink	Active cooled	Active cooled	Active cooled
Dimension	10.5 inches, double-slot, 1049g	268.6 x 111.15 x 38.5	268.6 x 111.15 x 38.5	254.6 x 111.15 x 38.5
Advanced Display	SYNC 2	SYNC 2	Coming Soon	Coming Soon
SLI/NVLink Support	NVLink	NA	NA	NA
Disclaimers				

Ethernet Specifications Group 1 Part 1

Card	Intel I210-T1 Single Port Gigabit Ethernet Adapter (Springville)	Intel I350-T2 Dual Port Gigabit Ethernet Adapter (Stony Lake T2)	Intel I350-T4 Quad Port Gigabit Ethernet Adapter (Stony Lake T4)	M.2 W 2280 Intel V 7200 2*2 (6000) vPro C
Supplier PN	I210T1, MM# 941033	I350T2G1P20, MM# 928941	I350T4G1P20, MM# 928942	AX211N
Data Rates Supported	10/100/1000Mbps copper	10/100/1000Mbps (Copper), 1000Mbps (Fiber)	10/100/1000Mbps (Copper), 1000Mbps (Fiber)	2.4 Gb/s
Controller Details	Intel® Ethernet Controller I210	Intel Ethernet Controller I350	Intel Ethernet Controller I351	Wi-Fi 6E
Controller Bus Architecture	PCIe 2.1 (5GT/s)	PCIe 2.1 (5GT/s)	PCIe 2.1 (5GT/s)	M.2: C

Data Transfer Mode	Ethernet	Ethernet	Ethernet	2.4, 5, 160M
Power Consumption	0.81W	Copper: I350-T2 V2= 4.4W Fiber: I350-F2= 5.5W	Copper: I350T4V2= 5W LC-Fiber: I350F4= 6W	Wi-Fi: Bluetooth 100mW
IEEE Standards Compliance	IEEE 802.3/10BASE-T, 100BASE-TX, 1000BASE-T	IEEE 802.3/10BASE-T, 100BASE-TX, 1000BASE-T	IEEE 802.3/10BASE-T, 100BASE-TX, 1000BASE-T	IEEE 802.3 and serial ATA (select coverage) IEEE 802.3 g, h, i, ac, ax; Measurement based 2016, 8
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	PXE boot, Intel iSCSI Remote Boot for Windows, Linux and VMware, Intel BootAgent Software via PXE or BootP, WDMS or UEFI	Not Available
Network Transfer Mode (Full/Half Duplex)	Supported	Supported	Supported	Not Available
Network Transfer Rate	1,000Mbps Full Duplex	1,000Mbps Full Duplex	1,000Mbps Full Duplex	2178M
a	Windows 7/8/10, Linux, Free BSD, XEN, VMware	Windows 7/8/10, Linux, Free BSD, XEN, VMware	Windows 7/8/10, Linux, Free BSD, XEN, VMware	Windows bit*, Linux
Manageability	Supported	Supported	Supported	Not Available
Manageability Capabilities Alerting	Supported	Supported	Supported	Not Available
TDP	Firmware Based Thermal Management	Firmware Based Thermal Management	Firmware Based Thermal Management	Based on power consumption measurement five minutes max through activity
Operating Temperature Range	0°C to 55°C (32°F to 131°F)	0°C to 55°C (32°F to 131°F)	0°C to 55°C (32°F to 131°F)	0°C to 55°C
# of Ports	1	2	4	Not Available
Data Rate Per Port	10/100/1000Mbps (copper)	10/100/1000Mbps (copper), 1000Mbps (fiber)	10/100/1000Mbps (copper), 1000Mbps (fiber)	Not Available
System Interface Type	PCIe Gen 2.1	PCIe Gen 2.1	PCIe Gen 2.1	M.2: C
NC Sideband Interface	Not Available	Not Available	Not Available	Not Available
Jumbo Frames Supported	Yes	Yes	Yes	Not Available
1000Base-T	Yes	Yes	Yes	Not Available
MACsec IEEE 802.1 AE	Coming Soon	Coming Soon	Coming Soon	Not Available
IEEE 1588	Supported	Supported	Supported	Not Available

Supported Under vPro	Not Available	Not Available	Not Available	Yes
Disclaimers				

Ethernet Specifications Group 1 Part 2

Model	i210-T1	I350-T2	I350-T4	M.2 W Intel V 2*2 (6C vPro C
Connector	RJ-45 Copper	2 x Ports RJ-45 Copper	4 x Ports RJ-45 Copper	M.2:CN
Website	i210 T1	i350 T2	i350 T4	Intel® AX211
Auto-Negotiation	IEEE* 802.3* Auto- negotiaton	IEEE* 802.3* Auto- negotiaton	IEEE* 802.3* Auto- negotiaton	dual b Stand R2 2x2 160 Ml suppc 2.4, 5, 1 (160M
Intel® vPro™	Not Available	Not Available	Not Available	Yes Int
Intel® Stable Image Platform Program (SIPP)	Coming Soon	Coming Soon	Coming Soon	Not Av
Intel® Standard Manageability	Supported	Supported	Supported	Not Av
Power Optimizer Platform Low- power Management Systems	Supported	Supported	Supported	Lower based proce
Energy Efficient Ethernet	Supported	Supported	Supported	Suppc
TCP/UDP Checksum and Segmentation Offload (IPv4 and IPv6)	Supported	Supported	Supported	Not Av
Receive Side Scaling	Supported	Supported	Supported	Comir
Dual Tx and Rx Queues	Yes	Yes	Yes	MIMO Rx/Rx
Jumbo Frames (up to 9KB)	Supported	Supported	Supported	Not Av
Teaming	Supported	Supported	Supported	Not Av
Wake from Deep Sx	Supported	Supported	Supported	Not Av
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	Windows Server 2008, 2012, 2016. 2019 Linux (RHEL/SLES), Free BSD, Xen, Vmware	Micros Windc Micros Windc Linux*
Network Proxy/ARP Support	Supported	Supported	Supported	Not Av

Ethernet Specifications Group 2 Part 1

Card	Bitland RTL8168H 1000M PCIE HP	Broadcom 5720 2- Ports PCIeX1	Broadcom 5719 4- Ports PCIeX4	Connect
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		Gigabit Ethernet Adapter	Gigabit Ethernet Adapter	
Disclaimers				

Ethernet Specifications Group 2 Part 2

Model	Bitland RTL8168H 1000M PCIE HP	Broadcom 5720 2-Ports PCIe1 Gigabit Ethernet Adapter	Broadcom 5719 4-Ports PCIe4 Gigabit Ethernet Adapter	Connect
Connector	1 Port RJ-45	2 Port RJ-45	4 Port RJ-45	2 x Ports
Website	IC Datasheet	Coming Soon	Coming Soon	Connect (MCX62 ADAT)
10BASE-T (IEEE 802.3 specification conformance)	Coming Soon	Coming Soon	Coming Soon	Not Sup
100BASE-TX (IEEE 802.3 specification conformance)	Coming Soon	Coming Soon	Coming Soon	Not Sup
1000BASE-T (IEEE 802.3 specification conformance)	Coming Soon	Coming Soon	Coming Soon	Support
Auto-Negotiation	Auto-Negotiation with Next Page capability	IEEE* 802.3ab Auto-negotiaton	IEEE* 802.3ab Auto-negotiaton	Support
Intel® vPro™	Not Available	Not Available	Not Available	Not Avail
Intel® Stable Image Platform Program (SIPP)	Not Available	Not Available	Not Available	Not Avail
Intel® Standard Manageability	Not Available	Not Available	Not Available	Not Avail
Power Optimizer Platform Low-power Management Systems	Supported	Supported	Supported	No
Energy Efficient Ethernet	Supported	Supported	Supported	Support
TCP/UDP Checksum and Segmentation Offload (IPv4 and IPv6)	Coming Soon	Supported	Supported	Support
Receive Side Scaling	Supported	Supported	Supported	Support
Dual Tx and Rx Queues	Not Available	Supported	Supported	128
Jumbo Frames (up to 9KB)	Supported	Supported	Supported	Support
Teaming	Supported	Coming Soon	Coming Soon	N/A
Integrated Auto Connect Battery Saver (ACBS) Battery Savings	Coming Soon	Coming Soon	Coming Soon	No
Timing and Synchronization	Coming Soon	Coming Soon	Coming Soon	Support
Integrated Switched Voltage Regulator (iSVR)	Coming Soon	Coming Soon	Coming Soon	No
Shared Flash with System BIOS	Coming Soon	Coming Soon	Coming Soon	Not Sup
Wake from Deep Sx	Supported	Supported	Supported	Coming
Server Operating System Support	Windows Server 2008, 2012, 2016.	Windows 11, 64-bit, Windows 10, 64-bit,	Windows 11, 64-bit, Windows 10, 64-bit,	RHEL/C/ dows/V/

	2019 Linux (RHEL/SLES), Vmware	Linux	Linux	
Network Proxy/ARP Support	Supported	Supported	Supported	Support

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Description	Media Card reader (3 in 1) TWR
Interface Type	USB2.0
Form Factor	USB 2.0 Mass Storage Device

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 only interface) Available at Power-on With F1 Key
Bootblock Recovery	Recovers System BIOS if the Flash ROM Becomes 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 Becomes 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, SMP and Power-On Passwords Can Protect Boot and ROM-based Setup <ul style="list-style-type: none"> - Support Electronic Lock - Chassis Intrusion Detection - UEFI Secure Boot Support

	<ul style="list-style-type: none"> - HDD Password Can Protect HDD Data - Windows UEFI Firmware Update Support - Device Guard Support - Optional Access Panel Lock, Kensington Lock, and Pad Lock, BIOS Guard, Boot Guard - BIOS Self-Healing Gen 2 (RoT: EC) - Secure Wipe 2.0 - Subscription Certificate Storage - Certificate-based BIOS Authentication and Management – Phase 2 - BIOS Modification and Event Logging – Phase 1 - Customized BIOS Defaults - BIOS Settings in Intune Settings Catalog - Microsoft Modern (Cloud) Bare Metal Recovery “cBMR” - BIOS Initialization to Factory Default - FIDO2.0 supervised BIOS access
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 2.8 Device Guard Support Spec

Industry Standard Specification Support

UEFI	Unified Extensible Firmware Interface v2.78
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	NA (No PCI slot)
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	<ul style="list-style-type: none"> 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
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Hazardous Substances and Preparation	GDX Scip control
Batteries	UN38.3,MSDS
Safety, EMC Connection to the Telephone Network and Labeling	Not applicable

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 Brazil-INMETRO TUV-GS cTUVus IEC60950-1&IEC62368 CB Report/Certificate Saudi Arabia EQM Kuwait KUCAS China CCC Mark Singapore PSB 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	GDX Scip control
Materials Used	System 95% PCC recycled plastic front bezel Packaging Carton: 90% Recycled and/or FSC

	certified content3 Cushion: 90% Recycled EPE
TCO Certification	9.0
Disclaimers	EPEAT registered where applicable. EPEAT registration varies by country. See www.epeat.net for registration status by country.