Lenovo P360 Tower

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Product Name

Product Display Name	ThinkStation P360 Tower
Information Date	1-Sep-22
Hardware Maintenance Manual	P360 Tower HMM
Drivers & Software	P360 Tower Drivers & Software

SECTION I: Platform Overview

Description	Experience the power of a workstation at the price of a desktop with the ThinkStation P360 Tower. Built for mission-critical tasks that require superior reliability and powerful performance, the ThinkStation P360 leads on both counts and does it with exceptional all-around value.

CPU

Processor Support	Intel Alder Lake Core Series
Socket Type	Socket V (LGA 1700)

Operating Systems

Preloaded	Windows 11 Pro Windows 11 Home Ubuntu 20.04 LTS
Supported	Ubuntu 22.04 LTS Ubuntu 20.04 LTS Red Hat Enterprise Linux 8.6

Memory

Slots	Up to 4 DIMMs
Channels	Supports up to 4 DIMM Sockets, 2 Channels
Type	288-Pin, 1866/2133/2400/2666/2933/3200/4800 MHz ECC and non-ECC UDIMM
ECC Support	Yes, CPU Dependent
Speed	Up to 4400MHz
Max DIMM Size	32GB DDR5 UDIMM
Max System Memory	128GB

Storage

Total Bays/Size	2 x 3.5" 2 x 2.5"
SATA	3 x SATA Connectors, Gen 3
PCIe	2 x M.2 PCIe Connector, Gen 4 Onboard Additional M.2 NVMe Drive Supported by Single Adapter
eSATA	1 x eSATA Connector, Gen 3
Disclaimers	1. Additional parts/enclosures may be required for some configurations.

Video

Integrated Graphics	Intel Integrated UHD Graphics 770
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	PCIe 4.0 x16, Full Height, Full Length (Customized, 268mm), 75W, With Latch
Slot 2	PCIe 3.0 x1, Full Height, Half 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	1. PCIe Slot 3 is a x16 mechanical slot, x4 electrical slot.

Front I/O

USB	2 x USB 3.2 Gen 2 Type-A 10Gb/s 2 x USB 3.2 Gen 1 Type-A 5Gb/s 1 x USB 3.2 Gen 2 Type-C 10Gb/s
Audio	1 x Audio Jack (3.5mm) 1x 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 the Following: – Flex storage enclosure – Front-access storage enclosure
Disclaimers	Note: Actual USB throughout will vary depending on the type and quantity of USB devices used.

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Rear I/O

USB	4 x USB 3.2 Gen 1 Type-A 5Gb/s (w/ Smart power on)
Audio	1 x Rear (Line Out); Retaskable to 5.1
DisplayPort	2 x Standard (CPU dependent) Optional 1 x Rear Port (CPU dependent)
HDMI	1 x Standard Optional 1 x Rear Port (CPU dependent)
Type-C	Optional 1 x Rear Port (CPU dependent)
VGA Port	Optional 1 x Rear Port (CPU dependent)
Serial Port	Optional 1 x Rear Port
PS/2	Optional 2 x PS/2
Parallel Port	Option 1 x Rear Bracket
Optional USB Adapter	2-Port USB Expansion Card (USB3.0) PCIEx1-HP/LP 4-Port Serial Expansion Card PCIe X1-HP/LP Rear USB 3.2 Gen2x2 Type C PCIex4 Adapter
Optional Network Adapter	Bitland BN8E88 Single Port Gigabit Ethernet Adapter Intel I210-T1 Single Port Gigabit Ethernet Adapter Intel I350-T2 Dual Port Gigabit Ethernet Adapter
Disclaimers	Note: Actual USB throughout will vary depending on the type and quantity of USB devices used.

Ethernet

Vendor	Intel Jacksonville I219-LM (W/ AMT)
Speeds	10/100/1000Mbps
Functions	PXE, ASF, WOL, Jumbo Frames, Teaming
Connectors	1 x RJ45

Audio

Vendor	Realtek
Type	HD (5.1)
Internal Speaker	Yes
Connectors	2 x Front 3.5mm Jacks (Mic & Headphone) 1 x Rear 3.5mm Jacks (Line Out)
Chipset	ALC897Q-CG
Number of Channels	2 Channels (5.1 via driver selection)
Number of Bits/Audio Resolution	6 channels of DAC support 16/20/24-bit PCM 2 stereo ADC support 16/20-bit PCM

Thermal

Temp Sensors	Ambient Sensor VR Sensor Graphics Card Sensor (if applicable)
Fans	1 x CPU Fan 1 x Front Fan 1 x Rear Fan(optional) 1 x Power Supply Fan (inside PSU)

Power Specifications

Power Supply	750W	500W
Power Efficiency	90% Efficient @ 50% Load	92% Efficient @ 50% Load
Main	C14	C14
Operating Voltage Range	100 – 240V	100 – 240V
Rated Voltage Range	90-264VAC	90-264VAC
Rated Line Frequency	47Hz / 63Hz	47Hz / 63Hz
Operating Line Frequency Range	50Hz / 60Hz	50Hz / 60Hz

Rated Input Current	10A	7A
Graphics	1 x 8 pin (6+2)	1 x 8 pin (6+2)
Power Supply Fan	Yes	Yes
ENERGY STAR® Qualified (config dependent)	Yes	Yes
80 PLUS Compliant	Yes	Yes
Built-in Self Test (BIST) LED	No	No
Aux Power Drop	Yes	Yes

BIOS

Vendor	AMI
Self-Healing BIOS	Yes

Chassis Information

Color	Raven Black
PSU	750W and 500W Available, Autosensing, 80 PLUS Platinum Qualified for 750w and 500w
Thermal Solutions	Two System Fans Standard (1 front, 1 rear), One Fan per CPU, One PSU Fan
Dimensions	376mm/14.8" H 315.4mm/12.4" D 170mm/6.7" W
Weight	9.4kg / 20.7lbs

Packaging Dimensions

Height (mm/in)	540mm / 21.26"
Width (mm/in)	280mm / 11.02"

Depth (mm)	420mm / 16.54"
Weight (kgs/lbs)	11.76kg / 25.92 lbs

Security & Serviceability

TPM		Infineon SLB9672 TPM 2.0
Asset ID		Yes, 1024 x 8bit
vPro		Intel vPro for WS (AMT 14.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		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		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)
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 80% (non-condensing) Relative Humidity Storage/Transit: 10% to 90% (non-condensing) Wet Bulb Temperature Operating: 25°C (77°F) max Wet Bulb Temperature Non-operating: 40°C (104°F) max
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	Operation Shock: 3ms (15G) for 4 Axis (+X, -X, +Y,-Y) 3ms (30G) for 2 Axis (+Z, -Z), Half-sine Wave, Each Side Will do One Time Rack Operation Shock: 5ms (15G) for 6 Axis (+X, -X, +Y,-Y,+Z, -Z), Half-sine Wave, Each Side Will do One Time Non-operating Shock: Trapezoidal Wave, 45G, 11ms, 6 Sides (+X, -X, +Y,-Y, +Z ,-Z), Filter 300Hz, Each Side Shock One Time

SECTION II: Platform Detail

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

Motherboard Core

Processor Support	Intel Alder Lake Core Series
Socket Type	Socket V (LGA 1700)

Memory Support	DDR5 up to 4400MHz UDIMM 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-CG Codec
Ethernet	Intel Jacksonville I219LM

Supported Components

Processor Level	Intel Alder Lake – Core
Processor	i9-12900K i9-12900 i7-12700K i7-12700 i5-12600K i5-12600 i5-12500 i5-12400 i3-12300 i3-12100
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

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)

2.5" SATA Hard Disk Drive (HDD)	1TB 2.5" SATA HDD 7200rpm, 6Gb/s, 2.5" (FIPS certified) 1TB SATA 2.5" SATA HDD 7200rpm, 6Gb/s, 2.5" (non-FIPS certified)
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

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. Max supported RAID 0/1/5/10.

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

Keyboard and Pointing Devices

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

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PCIe Adapters

Network	Bitland BN8E88 Single Port Gigabit Ethernet Adapter Intel I210-T1 Single Port Gigabit Ethernet Adapter Intel I350-T2 Dual Port Gigabit Ethernet Adapter
Thunderbolt	Rear Thunderbolt PCIe Adapter
USB	Rear Dual Port USB 3.2 Gen 2 Type-C PCIe Adapter Rear Dual Port USB 3.0 PCIe Adapter
WiFi Cards	Intel PCIe WiFi Card With BT External Antenna Kit (AX201)
PCIe to M.2 Adapter Card	PCIe x4 to M.2 Adapter – Gen3 (for NVMe SSD)

SECTION III: Supported Component Detail

CPU Specifications Part 1

CPU	Intel Core i9-12900K	Intel Core i7-12700K	Intel Core i5-12600K	Intel Core i9-12900	Intel Core i7-12700
# of Cores	16c	12c	10c	16c	12c
# of Threads	32	20	16	24	20
Processor Base Frequency	3.2GHz	3.6GHz	3.7Ghz	2.4GHz	2.1GHz
Max Turbo Frequency	5.2GHz	5.0GHz	4.9Ghz	5.1GHz	4.9GHz
Cache	30M	25M	20M	30M	25M
TDP	125W	125W	125W	65W	65W

CPU Specifications Part 1

CPU	Intel Core i5-12600	Intel Core i5-12500	Intel Core i5-12400	Intel Core i3-12300	Intel Core i3-12100
# of Cores	6c	6c	6c	4c	4c

# of Threads	12	12	12	8	8
Processor Base Frequency	3.3GHz	3.0GHz	2.5GHz	3.5GHz	3.5GHz
Max Turbo Frequency	4.8GHz	4.6GHz	4.4GHz	4.4GHz	4.3GHz
Cache	18M	18M	18M	12M	12M
TDP	65W	65W	65W	60W	65W

HDD Specifications Part 1

Drive	1TB SATA – 7200rpm, 6Gb/s, 2.5"	1TB SATA – 7200rpm, 6Gb/s, 3.5"	1TB SATA – 7200rpm, 6Gb/s, 3.5" Enterprise	2TB SATA – 7200rpm, 6Gb/s, 3.5"	4TB SATA – 7200rpm, 6Gb/s, 3.5"
3.5" SATA Hard Disk Drive (HDD)	Not Available	Yes	Yes	Yes	Yes
2.5" SATA Hard Disk Drive (HDD)	Yes	Not Available	Not Available	Not Available	Not Available
Connector	SATA	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 Data Transfer Rate 216-226MB/s	
Spindle Speed (RPM)	7,200	7,200	7,200	7,200	7,200
Power Off to Spindle Stop (sec)	NA	NA	NA	NA	NA
DC Power to Drive Ready (sec)	3.5	<10.0	<17.0	<17.0	<17.0
Average Latency (msec)	4.2	4.16	4.16	4.16	4.16
Input (VDC)	5	5	5	5	5
Typical (Watts)	1.9	6.19	10.09	6.7	11.33
Idle (Watts)	0.7	4.6	4.86	4.5	5.45
Physical Dimensions	69.85mm x 100.34mm x 7mm	101.6mm x 146.99mm x 19.88mm	101.85mm x 147mm x 26.1mm	101.6mm x 146.99mm x 26.1mm	101.85mm x 147mm x 26.1mm
Weight (grams)	90	420	620	535	650

Operating (C) Ambient	0 to 60	0 to 60	5 to 60	0 to 60	5 to 60
Operating (C) Base Casting	60	60	60	60	60
Non-Operating (C) Ambient	(-40 to 70)	(-40 to 70)	(-40 to 70)	(-40 to 70)	(-40 to 70)
Gradient (C per Hour)	20	20	20	20	20
Operating (Gs @ 2ms)	400	70	Read 70 Gs / Write 40 Gs	80	Read 70 Gs / Write 40 Gs
Non-Operating (Gs @ 2ms)	1000	350	300	300	300

HDD Specifications Part 2

Drive	6TB SATA – 7200rpm, 6Gb/s, 3.5"
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 2280 M.2 2TB PCIe SSD (OPAL)	NVMe 2280 M.2 4TB 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	22 x 80 x 2.38
Interface Type	PCIe Gen 4×4	PCIe Gen 4×4	PCIe Gen 4×4	PCIe Gen 4×4	PCIe Gen 4×4
Power Active (AVG)	5.0W	5.8W	5.8W	5.8W	8W
Power Idle	40 mW	35 mW	35 mW	50mW	50mW
Typical Sequential Read	3300 MB/s	6000 MB/s	6400 MB/s	6400 MB/s	6400 MB/s
Typical Sequential Write	1250 MB/s	3200 MB/s	3800 MB/s	5000 MB/s	5000 MB/s
Burst Random Read (4K Queue Depth 32/8 thread);	240K IOPS	500K IOPS	550K IOPS	550K IOPS	650K IOPS
Burst Random Write (4K Queue Depth 32/8 thread)	300K IOPS	370K IOPS	400K IOPS	400K IOPS	450K IOPS
Operating Temperature Range	0 to 55°C	0 to 55°C	0 to 55°C	0 to 55°C	0 to 55°C
Endurance Rating (Lifetime Writes)	85 TB	150 TB	300 TB	600 TB	2400TB
Mean Time Between Failures (MTBF)	1.5M POH	2.0M POH	2.0M POH	2.0M POH	1.5M POH
Hardware Encryption	AES 256 bit	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	Operating > Read: 15 % to 85 % (Non-Condensing) Write 15 % to 80 % (Depend on the	Operating > Read: 15 % to 85 % (Non-Condensing) Write 15 % to 80 % (Depend on the

	Temperature) Storage/Transportation> 10 % to 80 % (Non-Condensing)	Temperature) Storage/Transportation> 10 % to 80 % (Non-Condensing)	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 Part 1

Adapter	Quadro T400 – 2GB GDDR6	Quadro T400 – 4GB GDDR6	Quadro T600	Quadro T1000- 4GB GDDR6	Quadro T1000 – 8GB GDDR6
Bus Interface	PCIe 3.0 x16	PCIe 3.0 x16	PCIe 3.0 x16	PCIe 3.0 x16	PCIe 3.0 x16
Display Interface	3 x mDP 1.4a	3 x mDP 1.4a	4 x mDP 1.4a	4 x mDP 1.4a	4 x mDP 1.4a
Graphics Chipset	TU117-825	TU117-850	TU117-850	TU117-875	TU117-875
Memory Clock Frequency (MHz)	5001MHz	5001MHz	5001MHz	5001MHz	5001MHz
Memory Size	2GB GDDR6	4GB GDDR6	4GB GDDR6	4GB GDDR6	8GB GDDR6
Memory Interface	64-bit	64-bit	128-bit	128-bit	128-bit
Memory Bandwidth	Up to 80GB/s	Up to 80GB/s	Up to 160GB/s	Up to 160GB/s	Up to 160GB/s
GPU Cores	CUDA Cores: 384	CUDA Cores: 384	CUDA Cores: 640	CUDA Cores: 896	CUDA Cores: 896
GPU Core Frequency (MHz)	2100MHz	420MHz (base)/2100MHz (max boost)	2100MHz	2100MHz	1065MHz (base)/2100MHz (max boost)
Maximum Power Consumption	30W	30W	40W	50W	50W
Supported Resolutions and Max Refresh Rates (Hz)	7680 x 4320 x 24 bpp @ 120Hz 7680 x 4320 x 24 bpp @ 60Hz	7680 x 4320 x 24 bpp @ 120Hz 7680 x 4320 x 24 bpp @ 60Hz	7680 x 4320 x 24 bpp @ 120Hz 7680 x 4320 x 24 bpp @ 60Hz	7680 x 4320 x 24 bpp @ 120Hz 7680 x 4320 x 24 bpp @ 60Hz	7680 x 4320 x 24 bpp @ 120Hz 7680 x 4320 x 24 bpp @ 60Hz

(Note: Analog and/or Digital)	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 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 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 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 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	Ultra-quiet Active Fansink	Ultra-quiet Active Fansink	Ultra-quiet Active Fansink
Dimension	2.713" H x 6.137" L Single Slot, Low Profile	2.713" H x 6.137" L Single Slot, Low Profile	2.713" H x 6.137" L Single Slot, Low Profile	2.713" H x 6.137" L Single Slot, Low Profile	2.713" H x 6.137" L Single Slot, Low Profile
Advanced Display	Not Available	Not Available	Not Available	Not Available	Not Available
SLI/NVLink Support	Not Available	Not Available	Not Available	Not Available	Not Available

Discrete Graphics Adapter Part 2

Adapter	NVIDIA Quadro A2000(DP x4) – 6GB GDDR6	NVIDIA Quadro A2000(DP x4) – 12GB GDDR6	Quadro RTX A4000	Quadro RTX A5000	Quadro RTX A4500
Bus Interface	PCI Express 4.0×16	PCI Express 4.0×16	PCIe 4.0 x16	PCIe 4.0 x16	PCI Express 4.0×16
Display Interface	4 x mDP 1.4a	4 x mDP 1.4a	4 x DP 1.4a	4 x DP 1.4a	DP *4
Graphics Chipset	GP106-850	GP106-850	GA104-875	GA102-850	PG132 SKU 510
Memory Clock Frequency (MHz)	6001MHz	6001MHz	7000MHz	8001MHz	8001MHz
Memory Size	6GB GDDR6	12GB GDDR6	16GB GDDR6	24GB GDDR6	20GB GDDR6
Memory Interface	192-bit	192-bit	256-bit	384-bit	320-bit
Memory Bandwidth	Up to 288GB/s	Up to 288GB/s	Up to 448GB/s	up to 768 GB/s	Coming Soon
GPU Cores	N/A	N/A	Coming Soon	Coming Soon	Coming Soon
GPU Core Frequency (MHz)	1493MHz	1493MHz	2100MHz	2100MHz	1065MHz (base)/2100MHz (max boost)
Maximum Power Consumption	70W	70W	140W	230W	200W
Supported Resolutions and Max Refresh Rates (Hz)	DP1.4a: 7680*4320*24bpp/120 Hz	DP1.4a: 7680*4320*24bpp/120 Hz	7680 x 4320 x 24 bpp @ 120Hz 7680 x 4320 x 24 bpp	7680 x 4320 x 24 bpp @ 120Hz 7680 x 4320 x 24 bpp	DP1.4a: 7680*4320*24bpp/120 Hz

(Note: Analog and/or Digital)	(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	(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	@ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz	@ 60Hz 7680 x 4320 x 36 bpp @ 60Hz 5120 x 3200 x 24 bpp @ 60Hz 5120 x 2880 x 24 bpp @ 60Hz	(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
Thermal Solution	Active Fansink	Active Fansink	Active Fansink	Active Fansink	Active Fansink
Dimension	6.6 inches, HHHL double-slot	6.6 inches, HHHL double-slot	4.4" H x 9.5" L Single Slot	4.4 inches x 10.5 inches, Double wide	9.5 inches, double-slot
Advanced Display	Not Available	Not Available	Not Available	SYNC 2	SYNC 2
SLI/NVLink Support	Not Available	Not Available	NVLink	NVLink	NVLink
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)	Bitland BN8E88 1000M PCIex1 noASF – FH/LP	2 x 2 AX WiFi with BT (M.2) vPro AX201-TWR/SFF
Supplier PN	I210T1, MM# 941033	I350T2G1P20, MM# 928941	I350T4G1P20, MM# 928942	1218-00934/1218-00933	Coming Soon
Data Rates Supported	10/100/1000Mbps copper	10/100/1000Mbps (Copper), 1000Mbps (Fiber)	10/100/1000Mbps (Copper), 1000Mbps (Fiber)	10M, 100M, and 1000M	Coming Soon
Controller Details	Intel® Ethernet Controller I210	Intel Ethernet Controller I350	Intel Ethernet Controller I351	REALTEK RTL8168E-VB-CG	Coming Soon
Controller Bus Architecture	PCIe 2.1 (5GT/s)	PCIe 2.1 (5GT/s)	PCIe 2.1 (5GT/s)	PCI Express 1.1 2.5GT/s	Coming Soon
Data Transfer Mode	Ethernet	Ethernet	Ethernet	Ethernet	Coming Soon
Power Consumption	0.81W	Copper: I350-T2 V2= 4.4W	Copper: I350T4V2= 5W	RTL8168E=0.53W	Coming Soon

		Fiber: I350-F2= 5.5W	LC-Fiber: I350F4= 6W		
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 802.1P Layer 2 Priority Encoding IEEE 802.1Q VLAN tagging IEEE 802.3az Draft 3.2 (EEE)	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	PXE boot, Intel iSCSI Remote Boot for Windows, Linux and Vmware, Intel BootAgent Software via PXE or BootP, WDMS or UEFI	Supported	Coming Soon
Network Transfer Mode (Full/Half Duplex)	Supported	Supported	Supported	Supported	Coming Soon
Network Transfer Rate	1,000Mbps Full Duplex	1,000Mbps Full Duplex	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	Windows 7/8/10, Linux, Free BSD, XEN,Vmware	Win10	Coming Soon
Manageability	Supported	Supported	Supported	Supported	Coming Soon
Manageability Capabilities Alerting	Supported	Supported	Supported	Supported	Coming Soon
TDP	Firmware Based Thermal Management	Firmware Based Thermal Management	Firmware Based Thermal Management	Not Available	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)	0°C to 55°C (32°F to 131°F)	O ℃, 50 ℃ (32 ° F to 122 ° F)	Coming Soon
# of Ports	1	2	4	1	Coming Soon
Data Rate Per Port	10/100/1000Mbps (copper)	10/100/1000Mbps (copper), 1000Mbps (fiber)	10/100/1000Mbps (copper), 1000Mbps (fiber)	10M, 100M, and 1000M	Coming Soon
System Interface Type	PCIe Gen 2.1	PCIe Gen 2.1	PCIe Gen 2.1	PCI Express 1.1	Coming Soon
NC Sideband Interface	Not Available	Not Available	Not Available	Not Available	Coming Soon
Jumbo Frames Supported	Yes	Yes	Yes	Yes	Coming Soon

1000Base-T	Yes	Yes	Yes	Yes	Coming Soon
MACsec IEEE 802.1 AE	Coming Soon	Coming Soon	Coming Soon	Coming Soon	Coming Soon
IEEE 1588	Supported	Supported	Supported	Not Available	Coming Soon
Supported Under vPro	Not Available	Not Available	Not Available	Not Available	Coming Soon
Disclaimers					

Ethernet Specifications Group 1 Part 2

Model	i210-T1	I350-T2	I350-T4	Bitland BN8E88 1000M PCIex1 noASF – FH/LP	2 x 2 AX WiFi with BT (M.2) vPro AX201-TWR/SFF
Connector	RJ-45 Copper	2 x Ports RJ-45 Copper	4 x Ports RJ-45 Copper	1 Port RJ-45	Coming Soon
Website	i210 T1	i350 T2	i350 T4	IC Datasheet	Coming Soon
Auto-Negotiation	IEEE* 802.3* Auto-negotiaton	IEEE* 802.3* Auto-negotiaton	IEEE* 802.3* Auto-negotiaton	Auto-Negotiation with Next Page capability	Coming Soon
Intel® vPro™	Not Available	Not Available	Not Available	Not Available	Coming Soon
Intel® Stable Image Platform Program (SIPP)	Coming Soon	Coming Soon	Coming Soon	Not Available	Coming Soon
Intel® Standard Manageablity	Supported	Supported	Supported	Not Available	Coming Soon
Power Optimizer Platform Low-power Management Systems	Supported	Supported	Supported	Supported	Coming Soon
Energy Efficient Ethernet	Supported	Supported	Supported	Supported	Coming Soon
TCP/UDP Checksum and Segmentation Offload (IPv4 and IPv6)	Supported	Supported	Supported	Coming Soon	Coming Soon
Receive Side Scaling	Supported	Supported	Supported	Supported	Coming Soon

Dual Tx and Rx Queues	Yes	Yes	Yes	Not Available	Coming Soon
Jumbo Frames (up to 9KB)	Supported	Supported	Supported	Supported	Coming Soon
Teaming	Supported	Supported	Supported	Supported	Coming Soon
Wake from Deep Sx	Supported	Supported	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	Windows Server 2008, 2012, 2016. 2019 Linux (RHEL/SLES), Free BSD, Xen, Vmware	Windows Server 2008, 2012, 2016. 2019 Linux (RHEL/SLES), Vmware	Coming Soon
Network Proxy/ARP Support	Supported	Supported	Supported	Supported	Coming Soon

Ethernet Specifications Group 2 Part 1

Card	Aquantia PCIex4 10GbE AQN-107 Gigabit Ethernet Adapter	Bitland RTL8168H 1000M PCIE HP	Broadcom 5720 2-Ports PCIex1 Gigabit Ethernet Adapter	Broadcom 5719 4-Ports PCIex4 Gigabit Ethernet Adapter	M.2 WiFi module – Intel Wi-Fi 6E AX211 2*2 (6GHz) +BT5.2-vPro CNVi
Supplier PN	AQN-107-124-SBL	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Data Rates Supported	10G/5G/2.5G/1G/100Mbps	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Controller Details	Coming Soon	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Controller Bus Architecture	PCIe Gen3	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Data Transfer Mode	Ethernet	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Power Consumption	Coming Soon	Coming Soon	Coming Soon	Coming Soon	Coming Soon
IEEE Standards Compliance	IEEE802.3an 10GBASE-T/5GBASE-T/2.5GBASE-T/1000BASE-T/100BASE-TX	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Boot ROM Support	PXE boot UEFI boot	Coming Soon	Coming Soon	Coming Soon	Coming Soon

Network Transfer Mode (Full/Half Duplex)	Supported	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Network Transfer Rate	10Gbps Full Duplex	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Operating System Driver Support	Microsoft® Windows® 10, 8.1, 8, 7 (32/64-bit), and Linux 3.2. 3.10, 3.12, 4.2, and 4.4 drivers	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Manageability	Coming Soon	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Manageability Capabilities Alerting	Coming Soon	Coming Soon	Coming Soon	Coming Soon	Coming Soon
TDP	Coming Soon	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Operating Temperature Range	0°C – 108°C	Coming Soon	Coming Soon	Coming Soon	Coming Soon
# of Ports	1	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Data Rate Per Port	10G/5G/2.5G/1G/100Mbps	Coming Soon	Coming Soon	Coming Soon	Coming Soon
System Interface Type	PCIe Gen3 x4	Coming Soon	Coming Soon	Coming Soon	Coming Soon
NC Sideband Interface	Coming Soon	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Jumbo Frames Supported	Yes	Coming Soon	Coming Soon	Coming Soon	Coming Soon
1000Base-T	Yes	Coming Soon	Coming Soon	Coming Soon	Coming Soon
MACsec IEEE 802.1 AE	Supported	Coming Soon	Coming Soon	Coming Soon	Coming Soon
IEEE 1588	Supported	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Supported Under vPro	Not Supported	Coming Soon	Coming Soon	Coming Soon	Coming Soon
Disclaimers					

Ethernet Specifications Group 2 Part 2

Model	Aquantia PCIex4 10GbE AQN-107	Bitland RTL8168H 1000M PCIE HP	Broadcom 5720 2-Ports PCIex1 Gigabit	Broadcom 5719 4-Ports PCIex4 Gigabit	M.2 WiFi module – Intel Wi-Fi 6E AX211

	Gigabit Ethernet Adapter		Ethernet Adapter	Ethernet Adapter	2*2 (6GHz) +BT5.2-vPro CNVi
Connector	Coming Soon	1 Port RJ-45	2 Port RJ-45	4 Port RJ-45	Coming Soon
Website	Coming Soon	IC Datasheet	Coming Soon	Coming Soon	Coming Soon
Auto-Negotiation	Coming Soon	Auto-Negotiation with Next Page capability	IEEE* 802.3ab Auto-negotiaton	IEEE* 802.3ab Auto-negotiaton	Coming Soon
Intel® vPro™	Coming Soon	Not Available	Not Available	Not Available	Coming Soon
Intel® Stable Image Platform Program (SIPP)	Coming Soon	Not Available	Not Available	Not Available	Coming Soon
Intel® Standard Manageablity	Coming Soon	Not Available	Not Available	Not Available	Coming Soon
Power Optimizer Platform Low-power Management Systems	Coming Soon	Supported	Supported	Supported	Coming Soon
Energy Efficient Ethernet	Coming Soon	Supported	Supported	Supported	Coming Soon
TCP/UDP Checksum and Segmentation Offload (IPv4 and IPv6)	Coming Soon	Coming Soon	Supported	Supported	Coming Soon
Receive Side Scaling	Coming Soon	Supported	Supported	Supported	Coming Soon
Dual Tx and Rx Queues	Coming Soon	Not Available	Supported	Supported	Coming Soon
Jumbo Frames (up to 9KB)	Coming Soon	Supported	Supported	Supported	Coming Soon
Teaming	Coming Soon	Supported	Coming Soon	Coming Soon	Coming Soon
Wake from Deep Sx	Coming Soon	Supported	Supported	Supported	Coming Soon
Server Operating System Support	Coming Soon	Windows Server 2008, 2012, 2016. 2019 Linux (RHEL/SLES), Vmware	Windows 11, 64-bit, Windows 10, 64-bit, Linux	Windows 11, 64-bit, Windows 10, 64-bit, Linux	Coming Soon
Network Proxy/ARP Support	Coming Soon	Supported	Supported	Supported	Coming Soon

Media Card Reader

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 – Support Electronic Lock – Chassis Intrusion Detection – UEFI Secure Boot Support – 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
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 v2.7
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	El 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	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	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

Environmentals

Energy Star	ENERGY STAR 8.0
EPEAT	EPEAT Certification Available on Select Models
ErP Lot-3 2013	Yes
Hazardous Substances	GDX Scip control
TCO Certification	9.0