

Lenovo P7

Version: 3.0 | 07/18/2023

Downloads

Hardware Maintenance Manual	P7 HMM
Drivers & Software	P7 Drivers and Software
Available Whitepapers	Power Configurator Memory Configurator Storage Configurator Windows 11 Installation Windows 10 Installation Red Hat Enterprise Linux 9 Installation Ubuntu Linux 22.04 LTS Installation

SECTION I: Platform Overview

Description	The bold Lenovo ThinkStation P7 is a force to be reckoned with and brings together a breakthrough new compute architecture with an advanced thermal design in a rack-optimized, Aston Martin-inspired chassis. Featuring the latest Intel® Xeon® W processors, up to 56 cores, robust PCIe Gen 5 connectivity, and highspeed DDR5 memory, the P7 delivers staggering performance output from a single-socket platform.
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CPU

Processor Support	4th Generation Intel Xeon Scalable Processors
Socket Type	Socket-E (LGA-4677)

Operating Systems

Preloaded	Windows 11 Pro 64-bit for Workstation Windows 10 Pro 64-bit for Workstation Windows 10 IOT Ubuntu 22.04 LTS (configuration specific)
Supported	Windows 10 Enterprise Edition Red Hat Enterprise Linux 9.x Ubuntu 22.04 LTS

Memory

Slots	Up to 8 DIMMS
Channels	8 Memory Channels
Type	DDR5, 288-Pin, ECC RDIMM and 3DS RDIMMS*
ECC Support	Yes
Speed	Up to 4800MHz
Max DIMM Size	64GB DDR5 ECC RDIMM 128GB DDR5 ECC 3DS-RDIMM
Max System Memory	1TB
Disclaimers	*Actual Memory Speed is dependent on the CPU

Storage

Total Bays/Size	3 (2 std, 1 optional)
SATA	3 x SATA 3.0 Connectors
PCIe (M.2)	2 x M.2 NVMe 2280/22110 PCIe Connectors Onboard (Gen5) 1x optional M.2 NVMe 2280/22110 Onboard (Gen4)
Disclaimers	*See Storage Whitepaper for details on the available usage options.

Video

Integrated Graphics	Not Available
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 5.0 x16, Full Height, Full Length, 75W
Slot 2	PCIe 4.0 x8, Full Height, Full Length, 25W, Open Ended
Slot 3	PCIe 5.0 x16, Full Height, Full Length, 75W
Slot 4	PCIe 4.0 x4, Full Height, Full Length, 25W, Open Ended
Slot 5	PCIe 5.0 x16, Full Height, Full Length, 75W
Slot 6	PCIe 4.0 x16, Full Height, Full Length, 75W
Slot 7	PCIe 5.0 x4, Full Height, Full Length, 25W, Open Ended
Disclaimers	Note: Slot 7 will not support a full length card when the vertical M.2 option is installed

Front I/O

USB	2 x USB-A 3.2 Gen 2 (10Gbps) 2 x USB-C 3.2 Gen 2 (10Gbps)
Audio	1 x 3.5mm Global Headset Jack (Headphone + Mic in)
Media Card Reader	USB 3.0 15-in-1 Media card reader supporting SD UHS-II (Optional)
Flex Bay	Front access drive bay
Disclaimers	Note: Actual USB throughput will vary depending on the type and quantity of USB devices used.

Rear I/O

USB	3x USB-A 3.2 Gen 1 (5Gbps) 2 x USB-A 2.0 (480Mbps) 1x USB-C 3.2 Gen 2x2 (20Gbps)
Audio	2 x Rear (Line Out, Line In retasked as Mic)
DisplayPort	As Supported by GPU
HDMI	As Supported by GPU
Serial Port	Optional 1x Rear Port
Ethernet	1 x 1GbE - RJ45 1 x 10GbE - RJ45
PS/2	Optional PS/2 AIC PCIe adapter (2 port)
Optional Network Adapter	Bitland RTL8168H 1000M PCIE Ethernet Adapter Intel I210-T1 Single Port Gigabit Ethernet Adapter Intel I350-T2 Dual Port Gigabit Ethernet Adapter Intel I350-T4 Quad Port Gigabit Ethernet Adapter Intel AX210 WIFI PCIe adapter with Internal Antennas
Disclaimers	Note: Actual USB throughout will vary depending on the type and quantity of USB devices used.

Ethernet

Vendor	Aquantia 10 GbE AQC113C-B1-C Intel 1 GbE I219 (Vpro, AMT)
Speeds	10/100/1000/10000Mbps Aquantia AQC113C 10/100/1000Mbps Intel I219
Functions	PXE, WOL, Jumbo Frames ASF, Teaming (Intel only)
Connectors	2 x RJ45
Disclaimers	Note: Network speeds listed are theoretical.

Audio

Vendor	Realtek
Type	HD (2.0)
Internal Speaker	1 x 1.5 watt 4 ohm
Connectors	2 x Rear 3.5mm Jacks (Line Out, Line In retasked as Mic) 1 x Front 3.5mm Global Headset Jack (Headphone + Mic in)
Chipset	Realtek ALC897Q Codec (rear) Realtec ALC4032 (front)
Number of Channels	Rear Audio: 2 Channels Front Audio: 2 Channels
Number of Bits/Audio Resolution	Rear Codec: 10 Channel DAC Supports 16/20/24-bit PCM 2 Stereo ADC Supports 16/20/24-bit PCM Front Codec: One stereo DAC supports 8/16/22.05/24/32/44.1/48/96/176.4/192KHz Sample Rate, 16/24-bit One stereo ADC supports 8/16/22.05/24/32/44.1/48/96KHz Sample Rate, 16/24-bit
Disclaimers	*Note: Audio Codec ALC897Q can support 7.1 channel, but motherboard only has 2 rear jacks - MIC in and Line out, only 2 channel for Line out.

Thermal

Temp Sensors	Ambient Cabled Sensor - Thermistor, MB Header cabled to chassis front bezel PCIe Zone 1 Sensor - Thermistor PCIe Zone 2 Sensor - Thermistor PCIe Zone 3 Sensor - Thermistor PCIe Zone 4 Sensor - Thermistor DIMM Right Sensor - Thermistor DIMM Left Sensor - Thermistor Storage (M.2) Sensor - Thermistor
Fans	2x Front PCIe Fans (PCIe1_4_FAN & PCIe5_7_Fan) - 4-pin cable connector 1x Front BCB Optional Fan (FAN_INT_STORG) - 4-pin cable connector 2x Memory Fans (MEM_FAN_B & MEM_FAN_T) - 4-pin cable connector 1x Rear Fan (REAR_FAN1) - 4-pin cable connector 1x CPU Fan (FAN_CPU) - 4-pin cable connector

	1x CPU Optional Fan (FAN_FRNT) - 8-pin cable connector 1x Front Flex Bay Optional Fan (FLEX_BAY_FAN) - 4-pin cable connector PSU Fans - provided by PSU vendor
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Power Specifications

Power Supply	1000W / 1400W
Power Efficiency	92% Efficient @ 50% Load
Main	C14 socket to std C13 line cord
Operating Voltage Range	100 - 240V (autosensing)
Rated Voltage Range	90-264VAC
Rated Line Frequency	47Hz / 63Hz
Operating Line Frequency Range	50Hz / 60Hz
Rated Input Current	1000W: 6A-12A 1400W: 9A-15A
Graphics	Up to 6 x 8-pin (6+2) PCIe*
Power Supply Fan	Yes
ENERGY STAR® Qualified (config dependent)	Yes
80 PLUS Compliant	Yes
Built-in Self Test (BIST) LED	Yes
Disclaimers	Note: Power Output of 1400W PSU Limited to 1125W for 100-111.9 Input Voltage. *Quantity of Graphics power cables is configuration dependent *See Power Configuration Whitepaper for additional details.

BIOS

Vendor	AMI
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Chassis Information

Color	Storm Gray
PSU	One Fixed 1400W, Autosensing, 92% PSU, 80 PLUS Platinum Qualified or One Fixed 1000W, Autosensing, 92% PSU, 80 PLUS Platinum Qualified
Thermal Solutions	3 Front PCIe Fans 1 Rear Fan 2 CPU Fans (1 optional, 200-250W CPU SKUs) 1 Front Access Storage Fan (optional, configuration dependent) 2 DIMM Memory Fans 1 CPU Heatsink Fan 2 Autonomous PSU Fans

Dimensions	434mm / 17.1" H (without feet) 440mm / 17.3" (with feet) 508mm / 20" D 175mm / 6.9" W
Weight	23kg / 49.6lbs (max config)

Packaging Dimensions

Height (mm/in)	618mm / 24.23"
Width (mm/in)	324mm / 12.8"
Depth (mm)	695mm / 27.4"
Weight (kgs/lbs)	26.2kg / 57.8lbs (max config)

Security & Serviceability

TPM	Infineon SPI TPM SLB9672 TPM 2.0
Asset ID	Yes, 1024 x 8bit
vPro	Yes
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	Yes - common or unique
Boot Sequence Control	Yes
Padlock Support	No
Boot Without Keyboard and/or Mouse	Yes
Access Panel	Tool-less Side Cover Removal
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 Download Recovery Service

	or available through Lenovo Support.
Disclaimers	*Note: CPU Heatsink assembly requires a T30 bit.

Operating Environment

Air Temperature	Operating: 10 ⁰ C to 35 ⁰ C (50 ⁰ F to 95 ⁰ F)
Storage	Storage: -40 ⁰ C to 60 ⁰ C (-40 ⁰ F to 140 ⁰ F) in Original Shipping Carton Storage: -10 ⁰ C to 60 ⁰ C (14 ⁰ F to 140 ⁰ 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 ⁰ C (77 ⁰ F) max Wet Bulb Temperature Non-operating: 40 ⁰ C (104 ⁰ F) max
Altitude	Upper limits decrease 1°C (1.8°F) per 300 m (1000 ft) above sea level
Vibration	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: X,Y axis: +- 15G/3ms Z axis: +- 30G/3ms Operating (Rack mounted): X,Y,Z axis: +- 15G/3ms Non-operating target: Trapezoidal shock, 35g average, 11ms

SECTION II: Platform Detail

Board Size	15" x 11.57" (381mm x 294mm)
Layout	Lenovo Custom Extended ATX

Motherboard Core

Processor Support	Intel(R) Xeon(R) W-3400 series processors
Socket Type	Socket E (LGA 4677)
Memory Support	DDR5 up to 4800MHz RDIMM / 3DS RDIMM Memory
Voltage Regulator	Intel VR14.0 - 400W TDP Capable
Chipset (PCH)	Intel Alder Lake S PCH W790
Flash	2 x 64MB
Super I/O	1 x MEC1723(176 pin)
Clock	External Clock
Audio	Rear Codec: Realtek ALC897Q (Rear I/O) Front Codec: Realtek ALC4032 (FPIO)
Ethernet	Aquantia 10Gb AQC113C-B1-C

Supported Components

Processor Level	Intel Xeon Sapphire Rapids
Processor	Intel Xeon W9-3495X Intel Xeon W9-3475X Intel Xeon W7-3465X Intel Xeon W7-3455 Intel Xeon W7-3445 Intel Xeon W5-3435X Intel Xeon W5-3433 Intel Xeon W5-3425 Intel Xeon W5-3423
Memory Type	RDIMMs - 4800MHz, CPU Dependent
Memory	16GB DDR5 ECC RDIMM PC5-4800 32GB DDR5 ECC RDIMM PC5-4800 64GB DDR5 ECC RDIMM PC5-4800 128GB DDR5 ECC 3DS-RDIMM PC5-4800
Disclaimers	Additional CPU SKU's certified.

Storage

3.5" SATA Hard Disk Drive (HDD)	2TB SATA - 7200rpm, 6Gb/s, 3.5" 6TB SATA - 7200rpm, 6Gb/s, 3.5" (Enterprise Class) 12TB SATA - 7200rpm, 6Gb/s, 3.5" (Enterprise Class)
M.2 PCIe Solid State Drive (SSD)	512GB M.2 PCIe - SSD, 2280, Gen4 (x4), NVMe, TLC, OPAL2.0 1024GB M.2 PCIe - SSD, 2280, Gen4 (x4), NVMe, TLC, OPAL2.0 2048GB M.2 PCIe - SSD, 2280, Gen4 (x4), NVMe, TLC, OPAL2.0 4096GB M.2 PCIe - SSD, 2280, Gen4 (x4), NVMe, TLC, OPAL2.0
Disclaimers	Additional storage devices certified

RAID

RAID Requirements	M.2 and SATA RAID via Intel VROC Controller
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.
Intel VROC	Intel Virtual RAID On CPU (VROC) - Basic, Supports 0/1/10 Intel Virtual RAID On CPU (VROC) - Premium, Supports 0/1/5/10
Disclaimers	*NOTE: Some features available after launch

Optical Drive/Removable Media

Keyboard and Pointing Devices

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

Expansion Bays

5.25" External Access Bays	Front access drive bay
Internal Access Bays	Optional internal 3.5" drive bay

PCIe Adapters

Network	Bitland RTL8168H 1000M PCIE Ethernet Adapter Intel I210-T1 Single Port Gigabit Ethernet Adapter Intel I350-T2 Dual Port Gigabit Ethernet Adapter Intel I350-T4 Quad Port Gigabit Ethernet Adapter
WiFi Cards	Intel PCIe WiFi Card With BT Internal Antenna Kit (AX210 6E)
Parallel Card	PS/2 (2 Port) PCIe adapter
Com port	Serial COM port cable with 5V transceiver
PCIe to M.2 Adapter Card	ThinkStation Quad AIC Gen 3 M.2 adapter

SECTION III: Supported Component Detail

CPU Specifications

CPU	I n t e l X e o n P L A T I N	I n t e l X e o n P L A T I N	I n t e l X e o n G O L D 6 2	I n t e l X e o n G O L D 6 1	I n t e l X e o n G O L D 6 2	I n t e l X e o n G O L D 6 1	I n t e l X e o n G O L D 6 1	I n t e l X e o n G O L D 6 2	I n t e l X e o n G O L D 6 2	I n t e l X e o n G O L D 6 1	I n t e l X e o n G O L D 6 2	I n t e l X e o n G O L D 6 1	I n t e l X e o n G O L D 5 2	I n t e l X e o n G O L D 5 1	I n t e l X e o n G O L D 5 1	I n t e l X e o n G O L D 5 2	I n t e l X e o n G O L D 5	I n t e l X e o n G O L D 5	I n t e l X e o n S I L V E	I n t e l X e o n S I L V E	I n t e l X e o n S I L V E
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HDD Specifications

Drive	500GB SATA - 7200rpm, 6Gb/s, 2.5"	1TB SATA - 7200rpm, 6Gb/s, 3.5"	2TB SATA - 7200rpm, 6Gb/s, 3.5"	4TB SATA - 7200rpm, 6Gb/s, 3.5"	6TB 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	Sustained data transfer rate 216 - 226MB/s
Spindle Speed (RPM)	7,200	7,200	7,200	7,200	7,200
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	6.7	7.35	8.13
Idle (Watts)	0.7	4.6	4.5	5.45	6.21
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	101.85mm x 147mm x 26.1mm	101.85mm x 147mm x 26.1mm
Weight (grams)	90	420	535	680	705
Operating (C) Ambient	0 to 60	0 to 60	0 to 60	5 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	80	Read 70 Gs / Write 40 Gs	Read 70 Gs / Write 40 Gs
Non-Operating (Gs @ 2ms)	1000	350	300	300	250
Disclaimers					

Solid State Storage Specifications

Drive	256GB B 2.5" SATA SSD	512GB B 2.5" SATA SSD	1TB 2.5" SATA SSD	2TB 2.5" SATA SSD	256GB B NVM e M.2 SSD TLC	512GB B NVM e M.2 SSD TLC	1024GB NVM e M.2 SSD TLC	2048GB NVM e M.2 SSD TLC	480GB AIC Optane™ SSD	1.5TB U.2 Optane™ SSD
Dimensions Millimeters (W x D x H)	70 x 100 x 7.0	70 x 100 x 7.0	70 x 100 x 7.0	70 x 100 x 7.0	22 x 80 x 2.3	22 x 80 x 2.3	22 x 80 x 2.3	22 x 80 x 2.3	20 x 168 x 104	70 x 100 x 15

Interface Type	SATA -III	SATA -III	SATA -III	SATA -III	PCIe Gen 3.0 x4 NVMe	PCIe Gen 3.0 x4 NVMe	PCIe Gen 3.0 x4 NVMe	PCIe Gen 3.0 x4 NVMe	PCIe Gen 3.0 x4 NVMe	PCIe Gen 3.0 x4 NVMe
Power Active (AVG)	1.8W	1.9W	2.2W	6W	5W	5W	5W	5W	18W	18W
Power Idle	50mW	50mW	50mW	50mW	50mW	50mW	50mW	50mW	7W	7W
Typical Sequential Read	540 MB/s	540 MB/s	540 MB/s	530 MB/s	300 OMB/s	3200 MB/s	3200 MB/s	3500 MB/s	2700 MB/s	2700 MB/s
Typical Sequential Write	500 MB/s	500 MB/s	500 MB/s	500 MB/s	1300 MB/s	1600 MB/s	1600 MB/s	300 OMB/s	2200 MB/s	2200 MB/s
Operating Temperature Range	0 to 55°C	0 to 55°C	0 to 55°C	0 to 55°C	0 to 55°C	0 to 55°C	0 to 55°C	0 to 55°C	0 to 85°C	0 to 85°C
Endurance Rating (Lifetime Writes)	85TB	150TB	300TB	600TB	85TB	150TB	300TB	600TB	8.76 PB	27.3PB
Mean Time Between Failures (MTBF)	2.0M POH	2.0M POH	2.0M POH	2.0M POH	2.0M POH	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	AES 256 bit	AES 256 bit	AES 256 bit	No	No
Disclaimers	SSD performance measured with Crystal Disk Mark version 6.0.2 with the default 1000 MB data set. Sequential measurements are with 1 Thread, Queue-Depth 32. Random measurements are with 4 threads and queue-depth 32.									

HDD Controllers

PCI Bus	PCH Integrated
PCI Modes	SATA 3.0
RAID Levels	0/1/5/10
Data Transfer Rates	6Gb/s
Internal Connectors	2 x MiniSAS HD (2 ports each) + 3 x SATA
Disclaimers	

Optical Drive Specifications

Operating Systems Supported	Windows 10 Pro for Workstations (Preload) Windows 7 Pro 64 Red Hat Enterprise Linux 7.3 Ubuntu 16.04 and 18.04.2
Temperature	10° - 35°C (50° - 95°F)
Relative Humidity	10%-80% (non-condensing)
Maximum Wet Bulb Temperature	25°C max

Integrated Graphics Adapter

Discrete Graphics Adapter

[illegible]

	25 6	51 2	64 0	12 80	38 4	64 0	89 6	23 04 Tens or Cores :28 8 RT Cores :36	30 72 Tens or Cores :38 4 RT Cores :48	46 08 Tens or Cores :57 6 RT Cores :72	46 08 Tens or Cores :57 6 RT Cores :72	64 11 Tens or Cores :19 2 RT Cores :48	8,1 92 Tens or Cores :25 6 RT Cores :64	10, 75 2 Tens or Cores :33 6 RT Cores :84	51 20 Tens or Cores :64 0
GPU Core Frequency (MHz)	1228M Hz	1266M Hz	1266M Hz	1000 MHz	1005 MHz	1620 MHz	1440 MHz	1395M Hz	1132M Hz						
Maximum Power Consumption	30 W	40 W	47 W	75 W	30 W	40 W	50 W	Total board power: 160 W Total graphic s power: 125 W	Total board power: 265 W Total graphic s power: 230 W	Total board power: 295 W Total graphic s power: 260 W	Total board power: 295 W Total graphic s power: 260 W	140 W	230 W	300 W	250 W
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or Digital)	3 x 409 6x2 160 @ 60Hz z 1 x 512 0x2 880 @ 60Hz z	4 x 409 6x2 160 @ 60Hz z 4 x 512 0x2 880 @ 60Hz z	4 x 409 6x2 160 @ 60Hz z 4 x 512 0x2 880 @ 60Hz z	4 x 409 6x2 160 @ 120 Hz 4 x 512 0x2 880 @ 60Hz z	4 x 384 0x2 160 @ 120 Hz 4 x 512 0x2 880 @ 60Hz z 4 x 768 0x4 320 @ 60Hz z	4 x 409 6x2 160 @ 120 Hz 4 x 512 0x2 880 @ 60Hz z 2 x 768 0x4 320 @ 60Hz z	4 x 409 6x2 160 @ 120 Hz 4 x 512 0x2 880 @ 60Hz z 2 x 768 0x4 320 @ 60Hz z	4 x 384 0 x 216 0 @ 120 Hz 4 x 512 0x2 880 @ 60Hz z 2 x 768 0x4 320 @ 60Hz z	4 x 409 6x2 160 @ 120 Hz 4 x 512 0x2 880 @ 60Hz z 2 x 768 0x4 320 @ 60Hz z	4 x 409 6x2 160 @ 120 Hz 4 x 512 0x2 880 @ 60Hz z 2 x 768 0x4 320 @ 60Hz z	4 x 409 6x2 160 @ 120 Hz 4 x 512 0x2 880 @ 60Hz z 2 x 768 0x4 320 @ 60Hz z	4 x 409 6x2 160 @ 120 Hz 4 x 512 0x2 880 @ 60Hz z 2 x 768 0x4 320 @ 60Hz z	4 x 409 6x2 160 @ 120 Hz 4 x 512 0x2 880 @ 60Hz z 2 x 768 0x4 320 @ 60Hz z	4 x 409 6x2 160 @ 120 Hz 4 x 512 0x2 880 @ 60Hz z 2 x 768 0x4 320 @ 60Hz z	
Thermal Solution	Ult ra- quiet Ac tive Fa	Ult ra- quiet Ac tive Fa	Ult ra- quiet Ac tive Fa	Ult ra- quiet Ac tive Fa	Ac tive	Ac tive	Ac tive	Ult ra- quiet Ac tive Fa	Ult ra- quiet Ac tive Fa	Ult ra- quiet Ac tive Fa	Ult ra- quiet Ac tive Fa	Ac tive	Ac tive	Ac tive	Ult ra- quiet Ac tive Fa

	nsi nk	nsi nk	nsi nk	nsi nk				nsi nk	nsi nk	nsi nk	nsi nk				nsi nk
Dimension	2.7 13" H x 5.7 " L Sin gle Sl ot, Lo w Pr ofil e	2.7 13" H x 5.7 " L Sin gle Sl ot, Lo w Pr ofil e	2.7 13" H x 5.7 " L Sin gle Sl ot, Lo w Pr ofil e	4. 4" H x 7.9 " L Sin gle Sl ot	2.7 " H x 6.1 " L Sin gle Sl ot	2.7 " H x 6.1 " L Sin gle Sl ot	2.7 " H x 6.1 " L Sin gle Sl ot	4. 4" H x 9.5 " L Sin gle Sl ot	4. 4" H x 10. 5" L Du al Sl ot, Fu ll He igh t	4. 4" H x 10. 5" L Du al Sl ot, Fu ll He igh t	4. 4" H x 10. 5" L Du al Sl ot, Fu ll He igh t	4. 4" H x 9.5 " L Sin gle Sl ot	4. 4" H x 10. 5" L Du al Sl ot, Fu ll He igh t	4. 4" H x 10. 5" L Du al Sl ot, Fu ll He igh t	4. 4" H x 10. 5" L Du al Sl ot, Fu ll He igh t
Advanced Display	Not Avai labl e	Not Avai labl e	Not Avai labl e	Not Avai labl e	SYN C 2	SYN C 2	SYN C 2	SYN C 2	SYN C 2	SYN C 2	SYN C 2	SYN C 2	Not Avai labl e		
SLI/NVLink Support	Not Avail able	Not Avail able	Not Avail able	Not Avail able	Not Avail able	Not Avail able	NVL ink	NVL ink	NVL ink	NVL ink	NVL ink	NVL ink	NVL ink		
Disclaimers															

Intel® Ethernet Specifications

Card	Intel I210-T1 Single Port Gigabit Ethernet Adapt er (Sprin gville)	Intel I350- T2 Dual Port Gigabit Ethernet Adapt er (Stony Lake T2)	Intel I350- T4 Quad Port Gigabit Ethernet Adapt er (Stony Lake T4)	Intel X540- T2 Dual Port Coppe r 10Gb Ethernet Adapt er	Intel X710- DA2 Dual Port Fiber 10Gb Ethernet Adapt er	Intel Ethern et SFP+ SR Optics Module	Intel Dual Band Wirele ss-AC 7260 ASM	Intel Winsto rm Peak 8265 2x2 AC+BT 4.2 Vpro M.2 Combo
Supplier PN	I210T1, MM# 941033	I350T2 G1P20, MM# 928941	I350T4 G1P20, MM# 928942	MM#9 28955	MM# 952103	MM#: 941243	7260H MWD T X.R, MM# 936170	MM#: 946658
Data Rates Supported	10/100 /1000 Mbps copper	10/100 /1000 Mbps (Copp er), 1000M bps (Fiber)	10/100 /1000 Mbps (Copp er), 1000M bps (Fiber)	100/10 00Mbps and 10Gbp s Coppe r	1GbE/1 0GbE Optical fiber 10GbE Direct Attach (DAC)	Not Availab le	Intel Dual Band Wirele ss-AC 7260	Intel Dual Band Wirele ss-AC 8265
Controller Details	Intel® Ethern et Contro ller I210	Intel Ethern et Contro ller I350	Intel Ethern et Contro ller I351	Intel Ethern et Contro ller X540	Intel Ethern et Contro ller X710- AM2	Not Availab le	Intel Dual Band Wirele ss-AC 7260, Dual Band,	Intel Dual Band Wirele ss-AC 8265, 2x2, WiFi+B

							2x2, WiFi+B T	T, MU- MIMO
Controller Bus Architecture	PCIe 2.1 (5GT/s)	PCIe 2.1 (5GT/s)	PCIe 2.1 (5GT/s)	PCIe 2.1 (5GT/s)	PCIe 3.0 (8GT/s)	Not Availab le	PCIe M.2	PCIe M.2
Data Transfer Mode	Ethern et	Ethern et	Ethern et	Ethern et	Ethern et	Not Availab le	WiFi (802.11 ac), 2.4GHz , 5GHz	WiFi (802.11 ac), 2.4GHz , 5GHz
Power Consumption	0.81W	Coppe r: I350- T2 V2= 4.4W Fiber: I350- F2= 5.5W	Coppe r: I350T4 V2= 5W LC- Fiber: I350F4 = 6W	X540- T2: 10Gps= 17.4W 1Gbps= 9.5W 100Mb ps=6.6 W X540- T1: 10Gbp s=10.8 W 1Gbps= 7.7W 100Mb ps= 6.4W	Dual- port 10GBA SE- SR= 4.3W typ/4.8 W max Dual- port 1000B ASE- SX= 4W typ/4.3 W max Dual- port 10GBA SE- LR= 4.5W typ/ 5.1W max Dual- port Direct Attach (Twina x)= 3.3W typ/3.7 W max	Not Availab le	Not Availab le	Not Availab le
IEEE Standards Compliance	IEEE 802.3/1 0BASE -T, 100BA SE-TX, 1000B ASE-T	IEEE 802.3/1 0BASE -T, 100BA SE-TX, 1000B ASE-T	IEEE 802.3/1 0BASE -T, 100BA SE-TX, 1000B ASE-T	IEEE 802.3 100/10 00/10 GBASE -T	IEEE 802.3 1/1010 GBASE - SR/LR, SFF- 8431 10GSF P+DAC	Not Availab le	IEEE 802.11a bgn, 802.11a c, 802.11d , 802.11e, 802.11i, 802.11h , 802.11 w	IEEE 802.11a bgn, 802.11a c, 802.11d , 802.11e, 802.11i, 802.11h , 802.11 w, 802.11r, 802.11k, 802.11v (pendi ng)
Boot ROM Support	PXE boot, Intel iSCSI Remot e Boot	PXE boot, Intel iSCSI Remot e Boot	PXE boot, Intel iSCSI Remot e Boot	PXE boot, Intel iSCSI Remot e Boot	PXE boot, Intel iSCSI Remot e Boot	Not Availab le	Not Availab le	Not Availab le

	for Windows, Linux and Vmware, Intel BootAgent Software via PXE or BootP, WDMS or UEFI	for Windows, Linux and Vmware, Intel BootAgent Software via PXE or BootP, WDMS or UEFI	for Windows, Linux and Vmware, Intel BootAgent Software via PXE or BootP, WDMS or UEFI	for Windows, Linux and Vmware, Intel BootAgent Software via PXE or BootP, WDMS or UEFI	for Windows, Linux and Vmware, Intel BootAgent Software via PXE or BootP, WDMS or UEFI			
Network Transfer Mode (Full/Half Duplex)	Supported	Supported	Supported	Supported	Supported	Not Available	Not Available	Not Available
Network Transfer Rate	1,000Mbps Full Duplex	1,000Mbps Full Duplex	1,000Mbps Full Duplex	1,000Mbps Full Duplex	1,000Mbps Full Duplex	Not Available	300/867Mbps	867Mbps
Operating System Driver Support	Windows 7/8/10, Linux, FreeBSD, XEN, Vmware	Windows 7/8/10, Linux, FreeBSD, XEN, Vmware	Windows 7/8/10, Linux, FreeBSD, XEN, Vmware	Windows 7/8/10, Windows Server Linux, FreeBSD	Windows 2008, 2012; RHEL 6.5/7.0, FreeBSD 9/10, Vmware ESXi 5.x	Not Available	Windows 10, 32-bit*, Windows 10, 64-bit*, Windows 8.1, 32-bit*, Windows 8.1, 64-bit*, Windows 8, 32-bit*, Windows 8, 64-bit*, Windows 7, 32-bit*, Windows 7, 64-bit*, Linux*	Windows 10, 64-bit*, Windows 8.1, 64-bit*, Windows 7, 32-bit*, Windows 7, 64-bit*, Linux*
Manageability	Supported	Supported	Supported	Supported	Supported	Not Available	Not Available	Not Available
Manageability Capabilities Alerting	Supported	Supported	Supported	Supported	Supported	Not Available	Not Available	Not Available
TDP	Firmware Based Thermal Management	Firmware Based Thermal Management	Firmware Based Thermal Management	Firmware Based Thermal Management	Not Available	Not Available	Not Available	Not Available
Operating Temperature Range	0°C to 55°C (32°F)	0°C to 55°C (32°F)	0°C to 55°C (32°F)	0°C to 55°C (32°F)	0°C to 55°C (32°F)	Not Available	0°C to 80°C (32°F)	0°C to 80°C (32°F)

	to 131°F)	to 131°F)	to 131°F)	to 131°F)	to 131°F)		to 176°F)	to 176°F)
# of Ports	1	2	4	2	2	Not Available	Not Available	Not Available
Data Rate Per Port	10/100/1000 Mbps (copper)	10/100/1000 Mbps (copper), 1000Mbps (fiber)	10/100/1000 Mbps (copper), 1000Mbps (fiber)	100/1,000Mbps, 10Gbps	1Gbps, 10Gbps	Not Available	Not Available	Not Available
System Interface Type	PCIe Gen 2.1	PCIe Gen 2.1	PCIe Gen 2.1	PCIe Gen 2.1	PCIe 3.0	Not Available	PCIe M.2	PCIe M.2
NC Sideband Interface	Not Available	Not Available	Not Available	Not Available	Yes	Not Available	Not Available	Not Available
Jumbo Frames Supported	Yes	Yes	Yes	Yes	Yes	Not Available	Not Available	Not Available
1000Base-T	Yes	Yes	Yes	Yes	Not Available	Not Available	Not Available	Not Available
IEEE 1588	Supported	Supported	Supported	Not Available	Supported	Not Available	Not Available	Not Available
Supported Under vPro	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Supported	Supported
Disclaimers								

Ethernet

Model	i210-T1	Dual Port Copper = I350-T2V2 Dual Port LC-Fiber= I350-F2	Dual Port Copper = I350-T4 V2 Dual Port LC-Fiber= I350-F4	Dual Port Copper = X540-T2	X710-DA2	AC 7260 NGW	AC 8265 NGW
Connector	RJ-45 Copper	2 x Ports RJ-45 Copper or 2 x Ports LC-Fiber	4 x Ports RJ-45 Copper or 4 x Ports LC-Fiber	2 x Ports RJ-45 Copper	2 x SFPs Receptacle	2 x Antennas	2 x Antennas
Website	i210 T1	i350 T2/F2	i350 T4/F4	x540 T2	x710 DA2	7260 NGW	8265 NGW
Auto-Negotiation	IEEE* 802.3* Auto-negotiation	IEEE* 802.3* Auto-negotiation	IEEE* 802.3* Auto-negotiation	IEEE* 802.3* Auto-negotiation	IEEE* 802.3* Auto-negotiation	Not Available	Not Available

Intel® vPro™	Not Available	Not Available	Not Available	Not Available	Not Available	Supported	Supported
Intel® Standard Manageability	Supported	Supported	Supported	Supported	Supported	Not Available	Not Available
Power Optimizer Platform Low-power Management Systems	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Energy Efficient Ethernet	Supported	Supported	Supported	Not Available	Supported	Not Available	Not Available
TCP/UDP Checksum and Segmentation Offload (IPv4 and IPv6)	Supported	Supported	Supported	Supported	Supported	Not Available	Not Available
Receive Side Scaling	Supported	Supported	Supported	Supported	Supported	Not Available	Not Available
Dual Tx and Rx Queues	Yes	Yes	Yes	Yes	Yes	Not Available	Not Available
Jumbo Frames (up to 9KB)	Supported	Supported	Supported	Not Available	Supported	Not Available	Not Available
Teaming	Supported	Supported	Supported	Supported	Supported	Not Available	Not Available
Wake from Deep Sx	Supported	Supported	Supported	Not Available	Not Available	Not Available	Not Available
Server Operating System Support	Windows Server 2008, 2012, 2016, 2019 Linux (RHEL/SLES), FreeBSD, Xen, VMware	Windows Server 2008, 2012, 2016, 2019 Linux (RHEL/SLES), FreeBSD, Xen, VMware	Windows Server 2008, 2012, 2016, 2019 Linux (RHEL/SLES), FreeBSD, Xen, VMware	Windows Server 2003, 2008; RHEL 4, Linux/SLES 11, VMware	Windows 2008, 2012; RHEL 6.5/7.0, FreeBSD 9/10, VMware ESXi 5.x	Not Available	Not Available
Network Proxy/ARP Support	Supported	Supported	Supported	Supported	Supported	Not Available	Not Available
Disclaimers							

Media Card Reader

Description	9-in-1 (USB 2.0)
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 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	User and Administrator 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
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 2.6 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 v6.1
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 v3.0
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
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	• 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 REACH Article 33 information about substances in articles is available at: http://www.lenovo.com/social_responsibility/us/en/ThinkGreen_products.html#environment
Batteries	Not Available
Safety, EMC Connection to the Telephone Network and Labeling	Not Applicable, no Connection to a Telephone Network

Acoustic Noise Emissions Declaration

Safety, EMC Connection to the Telephone Network and Labeling

System Software Manager	Lenovo ThinkStation Supports Software Management Tools by Lenovo Vantage
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Regulations & Standards

EMC & Safety	FCC DoC for North America VCCI Certification for Japan BSMI Certification for Taiwan EU/EFTA CE Mark & DoC UL/CUL(P920,P720,P520,P520c), cTUVus(P330) UL-GS(P920,P720,P520,P520c), TUV-GS(P330) IEC60950-1 CB Report/Certificate Saudi Arabia SASO Kuwait KUCAS China CCC Mark Hong Kong SAR (CB report) Singapore PSB South Africa SABS Russia-EAC Morocco-CM Mexico-NOM Kazakhstan-EAC Belarus-EAC Serbia KVALITET Ukraine UKrCEPRO India-BIS USA Chemical Emission Test
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Environmentals

Energy Star	ENERGY STAR® v7.0
EPEAT	EPEAT® Silver Certification Available on Select Models
Greenguard	Greenguard
RoHS	RoHS Compliant
ErP Lot-3 2013	Yes
Hazardous Substances	• Products do not contain more than; 0.1% lead, 0.01% cadmium, 0.1% mercury, 0.1% hexavalent chromium, 0.1% polybrominated biphenyls (PBB) or 0.1% polybrominated diphenol ethers (PBDE) • Products do not contain Asbestos • Products do not contain Ozone Depleting Substances: Chlorofluorocarbons (CFC), hydrobromofluorocarbons (HBFC), hydrochlorofluorocarbons (HCFC), Halons, carbontetrachloride, 1,1,1-trichloroethane, methyl bromide • Products do not contain more than; 0.005% polychlorinated biphenyl (PCB), 0.005% polychlorinated terphenyl (PCT) in preparation • Products do not contain more than 0.1% short chain chloroparaffins

	(SCCP) with 10-13 carbon atoms in the chain containing at least 48% per mass of chlorine in the SCCP • Parts with direct and prolonged skin contact do not release nickel in concentrations above 0.5 microgram/cm²/week
TCO Certification	9.0
Disclaimers	EPEAT registered where applicable. EPEAT registration varies by country. See www.epeat.net for registration status by country.