

Lenovo P348

Version: 1.0 | 09/17/2021

Downloads

Hardware Maintenance Manual	P3348 HMM
Drivers & Software	P348 SFF Drivers & Software

SECTION I: Platform Overview

Description	Workstation power is now within your reach with the ThinkStation P348. Built for mission-critical tasks that require superior reliability and performance, the ThinkStation® P348 leads on both counts and does it with exceptional all-around value.
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CPU

Processor Support	Intel Rocket Lake Core Series
Socket Type	Socket-H4 (LGA 1200)

Operating Systems

Preloaded	Windows 10 Pro 64-bit Windows 10 Home 64-bit Ubuntu 20.04 LTS (configuration specific)
Supported	Ubuntu 20.04 LTS Red Hat Enterprise Linux 8.4

Memory

Slots	Up to 4 DIMMs
Channels	Supports up to 4 DIMM Sockets, 2 Channels
Type	288-Pin, 1866/2133/2400/2666/2933/3200 MHz non-ECC UDIMM
ECC Support	No
Speed	Up to 3200MHz
Max DIMM Size	32GB DDR4 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	1 x M.2 PCIe Connector, Gen 3 Onboard
Disclaimers	1. Additional parts/enclosures may be required for some configurations.

Video

Integrated Graphics	Intel Integrated UHD Graphics 750
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, 75W, With Latch
Slot 2	PCIe 3.0 x1, Full Height, Half Length, 25W
Slot 3	PCIe 3.0 x1, Full Height, Half Length, 25W

Front I/O

USB	2 x USB 3.2 Gen 2 Type-A 10Gb/s 4 x USB 3.2 Gen 1 Type-A 5Gb/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 throughput will vary depending on the type and quantity of USB devices used.

Rear I/O

USB	4 x USB 2.0 Type-A 480Mb/s
Audio	1 x Rear (Line Out) 1 x Rear (Line In) 1x Rear (Mic In)
DisplayPort	1 x Standard (CPU dependent)
HDMI	1 x Standard (CPU dependent)
VGA Port	1 x Standard (CPU dependent)
Serial Port	1 x Standard Optional 1 x Rear Port
Ethernet	1 x 1GbE - RJ45
PS/2	Optional 2 x PS/2
Parallel Port	Optional 1 x Rear Bracket
Optional USB Adapter	Rear USB 3.1 Gen 2 Type-C PCIe x4 Adapter 4-Port Serial Expansion Card PCIe x1 Adapter
Optional Network Adapter	Bitland BN8E88 Single Port Gigabit Ethernet Adapter Intel I210-T1 Single Port Gigabit Ethernet Adapter
Disclaimers	Note: Actual USB throughput will vary depending on the type and quantity of USB devices used.

Ethernet

Vendor	Realtek RTL8111K
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) 3 x Rear 3.5mm Jacks (Line In, Line Out, Mic)

Chipset	ALC623-CG
Number of Channels	2 Channels (5.1 via driver selection)
Number of Bits/Audio Resolution	6 Channel DAC supports 16/20/24 bit PCM 2 Channel ADC supports 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 1 x Power Supply Fan (inside PSU)

Power Specifications

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

BIOS

Vendor	AMI
Self-Healing BIOS	No

Chassis Information

Color	Raven Black
PSU	500W Available, Autosensing, 80 PLUS Platinum Qualified
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)	12.01kg / 26.47lbs

Security & Serviceability

TPM	fTPM
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	Yes

Points	
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 65°C (14°F to 149°F) Without Carton
Humidity	Relative Humidity Operating: 10% to 90% (non-condensing) Relative Humidity Storage/Transit: 10% to 90% (non-condensing) 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 Rocket Lake Core Series
Socket Type	Socket-H4 (LGA 1200)
Memory Support	DDR4 up to 3200MHz UDIMM Memory (non-ECC)

Voltage Regulator	65W TDP Capable
Chipset (PCH)	Intel W560 Chipset
Flash	32MB
Super I/O	Nuvoton NCT6686D
Clock	Intel Native isCLK
Audio	Realtek ALC623-CG Codec
Ethernet	Realtek RTL8111K

Supported Components

Processor Level	Intel Rocket Lake - Core
Processor	i9-11900 i7-11700 i5-11600 i5-11500
Memory Type	non-ECC UDIMMs - 3200MHz
Memory	8GB DDR4 non-ECC UDIMM PC4-3200 16GB DDR4 non-ECC UDIMM PC4-3200 32GB DDR4 non-ECC UDIMM PC4-3200

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)
M.2 PCIe Solid State Drive (SSD)	256GB M.2 PCIe SSD, Gen 3 x4, NVMe, OPAL 512GB M.2 PCIe SSD, Gen 3 x4, NVMe, OPAL 1024GB M.2 PCIe SSD, Gen 3 x4, NVMe, OPAL

RAID

RAID Levels and Requirements	No RAID Support
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Optical Drive/Removable Media

DVD-ROM Drive	Slim DVD-ROM Drive
DVD Burner/CD-RW Drive	Slim DVD Burner/CD-RW Drive
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 Fingerprint USB Mouse PS/2 Optical Mouse

PCIe Adapters

Network	Bitland BN8E88 Single Port Gigabit Ethernet Adapter Intel I210-T1 Single Port Gigabit Ethernet Adapter
USB	Rear Dual Port USB 3.0 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 (for NVMe SSD)

SECTION III: Supported Component Detail

CPU Specifications

CPU	Intel Core i9-11900	Intel Core i7-11700	Intel Core i5-11600	Intel Core i5-11500
# of Cores	8c	8c	6c	6c
# of Threads	16	16	12	12
Processor Base Frequency	2.5GHz	2.5GHz	2.8GHz	2.7GHz
Max Turbo Frequency	5.2GHz	4.9GHz	4.8GHz	4.6GHz
Cache	16M	16M	12M	12M
TDP	65W	65W	65W	65W

HDD Specifications

Drive	1TB SATA - 7200rpm, 6Gb/s, 3.5"	2TB SATA - 7200rpm, 6Gb/s, 3.5"	4TB SATA - 7200rpm, 6Gb/s, 3.5"
3.5" SATA Hard Disk Drive (HDD)	Yes	Yes	Yes
2.5" SATA Hard Disk Drive (HDD)	Not Available	Not Available	Not Available

Connector	SATA	SATA	SATA
Transfer Rate (Gb/sec)	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
Power Off to Spindle Stop (sec)	NA	NA	NA
DC Power to Drive Ready (sec)	<10.0	<17.0	<17.0
Average Latency (msec)	4.16	4.16	4.16
Input (VDC)	5	5	5
Typical (Watts)	6.19	6.7	11.33
Idle (Watts)	4.6	4.5	5.45
Physical Dimensions	101.6mm x 146.99mm x 19.88mm	101.6mm x 146.99mm x 26.1mm	101.85mm x 147mm x 26.1mm
Weight (grams)	420	535	650
Operating (C) Ambient	0 to 60	0 to 60	5 to 60
Operating (C) Base Casting	60	60	60
Non-Operating (C) Ambient	(-40 to 70)	(-40 to 70)	(-40 to 70)
Gradient (C per Hour)	20	20	20
Operating (Gs @ 2ms)	70	80	Read 70 Gs / Write 40 Gs
Non-Operating (Gs @ 2ms)	350	300	300
Disclaimers			

Solid State Storage Specifications

Drive	NVMe 2280 M.2 256GB PCIe SSD (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)
Dimensions Millimeters (W x D x H)	22 x 80 x 3	22 x 80 x 3	22 x 80 x 3	22 x 80 x 3
Interface Type	PCIe Gen 4x4	PCIe Gen 4x4	PCIe Gen 4x4	PCIe Gen 4x4
Power Active (AVG)	5.8W	5.8W	5.8W	5.8W
Power Idle	35 mW	35 mW	35 mW	35 mW
Typical Sequential Read	5000 MB/s	6000 MB/s	6400 MB/s	6400 MB/s
Typical Sequential Write	1600 MB/s	3200 MB/s	3800 MB/s	5000 MB/s
Burst Random Read (4K Queue Depth 32/8 thread);	250K IOPS	500K IOPS	550K IOPS	550K IOPS
Burst Random Write (4K Queue Depth 32/8 thread)	200K IOPS	370K IOPS	400K IOPS	400K IOPS
Operating Temperature Range	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

Mean Time Between Failures (MTBF)	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
Disclaimers				
HDD Controllers				
PCI Bus				
PCI Modes				
Data Transfer Rates				
Disclaimers				

Optical Drive Specifications

Description	9mm Slim DVD ROM Drive (SATA)- No OS/Linux	9mm Slim DVD ROM Drive (SATA)- Win10	9mm Slim DVD Burner/CD-RW Drive (SATA)- No OS/Linux	9mm Slim DVD Burner/CD-RW Drive (SATA)- Win10
Interface Type	SATA 1.5 Gb/s	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)	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	NA
Type	DVDROM	DVDROM	DVDWriter	DVDWriter
External Dimensions	NA	NA	NA	NA
Speed	NA	NA	NA	NA
Bay Type	9.0mm Tray	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	Business Black or without bezel
Removable	No	No	No	No
Internal Buffer Size	0.5MB Min	0.5MB Min	0.5MB Min	0.5MB Min
Writes	NA	NA	8XDVD+R / 8XDVD+RW / 6XDVD+R DL 8XDVD-R / 6XDVD-RW / 6XDVD-R DL 24XCD-R / 16XCD-RW	8XDVD+R / 8XDVD+RW / 6XDVD+R DL 8XDVD-R / 6XDVD-RW / 6XDVD-R DL 24XCD-R / 16XCD-RW
Reads	8XDVD-ROM / 24XCD-ROM	8XDVD-ROM / 24XCD-ROM	8XDVD-ROM / 24XCD-ROM	8XDVD-ROM / 24XCD-ROM
Source	DC Power 5V	DC Power 5V	DC Power 5V	DC Power 5V
DC Power Requirements	+5V±5%	+5V±5%	+5V±5%	+5V±5%
DC Current	Max 2.5A@5v	Max 2.5A@5v	Max 2.5A@5v	Max 2.5A@5v
Operating Systems Supported	All Windows OS	All Windows OS	All Windows OS	All Windows OS

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	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)	Operating > Read: 15 % to 85 % (Non-Condensing) Write 15 % to 80 % (Depend on the Temperature) Storage/Transportation> 10 % to 80 % (Non-Condensing)
Maximum Wet Bulb Temperature				
Disclaimers				

Integrated Graphics Adapter

Type	Intel® UHD Graphics 750
Display Interface	1x DP 1.4, 1x HDMI 2.0
Video Resolution (max)	5120 x 3200 @60Hz (DP) ,4096x2160@60Hz (HDMI)
Disclaimers	

Discrete Graphics Adapter

Adapter	Quadro T400	Quadro T600	QuadroT1000	RTX3060	WX3200
Bus Interface	PCIe 3.0 x16	PCIe 3.0 x16	PCIe 3.0 x16	PCIe 4.0 x16	PCIe 3.0 x8
Display Interface	3 x mDP 1.4a	4 x mDP 1.4a	4 x mDP 1.4a	HDMI*1: 7680*4320 @60Hz DP*3: 5120*2880@60Hz	4 x mDP
Graphics Chipset	TU117-825	TU117-850	TU117-875	Dev team, pls help to fill in	
Memory Clock Frequency (MHz)	5001MHz	5001MHz	5001MHz	8000MHz	Dev team, pls help to fill in
Memory Size	2GB GDDR6	4GB GDDR6	4GB GDDR6	12GB GDDR6	4GB GDDR5
Memory Interface	64-bit	128-bit	128-bit	192-bit	128-bit
Memory Bandwidth	Up to 80GB/s		Up to 160GB/s		Up to 160GB/s
GPU Cores	CUDA Cores: 384		CUDA Cores: 640		CUDA Cores: 896
GPU Core Frequency (MHz)	2100MHz		2100MHz		2100MHz

Maximum Power Consumption	30W	40W	50W	170W	55W
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	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	HDMI*1: 7680*4320@60 Hz DP*3: 5120*2880@60 Hz
Thermal Solution	Ultra-quiet Active Fansink	Ultra-quiet Active Fansink	Ultra-quiet Active Fansink	Active Fansink	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	225.55mm*117.5mm*35.8 mm	6.6" L, single slot
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
Disclaimers					

Intel® Ethernet Specifications

Card	Intel I210-T1 Single Port Gigabit Ethernet Adapter (Springville)	Bitland BN8E88 1000M PCIe1 noASF - FH/LP	2 x 2 AX WiFi with BT (M.2) vPro AX201-TWR/SFF
Supplier PN	I210T1, MM# 941033	1218-00934/1218-00933	
Data Rates Supported	10/100/1000Mbps copper	10M, 100M, and 1000M	
Controller Details	Intel® Ethernet Controller I210	REALTEK RTL8168E-VB-CG	
Controller Bus Architecture	PCIe 2.1 (5GT/s)	PCI Express 1.1 2.5GT/s	
Data Transfer Mode	Ethernet	Ethernet	
Power Consumption	0.81W	RTL8168E=0.53W	
IEEE Standards Compliance	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)	
Boot ROM Support	PXE boot, Intel iSCSI Remote Boot for Windows, Linux and VMware, Intel BootAgent Software via PXE or BootP, WDMS or UEFI	Supported	
Network Transfer Mode (Full/Half Duplex)	Supported	Supported	
Network Transfer Rate	1,000Mbps Full Duplex	1,000Mbps Full Duplex	
Operating System Driver Support	Windows 7/8/10, Linux, Free BSD, XEN, VMware	Win10	
Manageability	Supported	Supported	
Manageability Capabilities Alerting	Supported	Supported	

TDP	Firmware Based Thermal Management	Not Available
Operating Temperature Range	0°C to 55°C (32°F to 131°F)	0 °C, 50 °C (32 ° F to 122 ° F)
# of Ports	1	1
Data Rate Per Port	10/100/1000Mbps (copper)	10M, 100M, and 1000M
System Interface Type	PCIe Gen 2.1	PCI Express 1.1
NC Sideband Interface	Not Available	Not Available
Jumbo Frames Supported	Yes	Yes
1000Base-T	Yes	Yes
IEEE 1588	Supported	Not Available
Supported Under vPro	Not Available	Not Available
Disclaimers		

Ethernet

Model	i210-T1	Bitland BN8E88 1000M PCIe1 noASF - FH/LP	2 x 2 AX WiFi with BT (M.2) vPro AX201- TWR/SFF
Connector	RJ-45 Copper	1 Port RJ-45	
Website	i210 T1	IC Datasheet	
Auto-Negotiation	IEEE* 802.3* Auto-negotiaton	Auto-Negotiation with Next Page capability	
Intel® vPro™	Not Available	Not Available	
Intel® Stable Image Platform Program (SIPP)	Not Available		
Intel® Standard Manageability	Supported	Not Available	
Power Optimizer Platform Low-power Management Systems	Supported	Supported	
Energy Efficient Ethernet	Supported	Supported	
TCP/UDP Checksum and Segmentation Offload (IPv4 and IPv6)	Supported		
Receive Side Scaling	Supported	Supported	
Dual Tx and Rx Queues	Yes	Not Available	
Jumbo Frames (up to 9KB)	Supported	Supported	
Teaming	Not Available	Supported	
Wake from Deep Sx	Supported	Supported	
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), Vmware	
Network Proxy/ARP Support	Supported	Supported	
Disclaimers			

Media Card Reader

Description	Media Card reader (3 in 1) TWR
Interface Type	USB2.0
Form Factor	USB 2.0 Mass Storage Device
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	NA
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, 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
Intel(R) AMT (includes ASF 2.0)	NA
Intel(R) TXT	NA
Memory Modes	NA
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	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	PCI Express Base Specification v3.0
TPM	FW TPM2.0
UHCI	SATA 3.0
USB	Universal Serial Bus Revision v1.1 Universal Serial Bus v2.0 Universal Serial Bus v3.0 Universal Serial Bus v3.2

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

Acoustic Noise Emissions Declaration

LWAd(bels) Idle	3.6
LWAd(bels) Oper	4.5

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