

Lenovo P350 SFF

Version: 3 | 05/05/2023

Downloads

Hardware Maintenance Manual	P350 Small Form Factor HMM
Drivers & Software	P350 Drivers & Software

SECTION I: Platform Overview

Description	Experience the power of a workstation at the price of a desktop with the ThinkStation® P350 SFF; built for mission-critical tasks that require superior reliability and performance.
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CPU

Processor Support	Intel Rocket Lake Xeon W-1300 Series/Core Series Intel Comet Lake Xeon W-1200 Series/Core Series
Socket Type	Socket-H4 (LGA 1200)

Operating Systems

Preloaded	Windows 10 Pro 64-bit for Workstations 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 8.3

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 ECC and non-ECC UDIMM
ECC Support	Yes, CPU Dependent
Speed	Up to 3200MHz
Max DIMM Size	32GB DDR4 UDIMM
Max System Memory	128GB

Storage

Total Bays/Size	1 x 3.5" 1 x 2.5"
SATA	4 x SATA Connectors, Gen 3
PCIe	1 x M.2 PCIe Connector, Gen 3 Onboard 1 x M.2 PCIe Connector, Gen 4 Onboard Additional M.2 NVMe Drive Supported by Single Adapter
Disclaimers	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, Half Height, Half Length, 75W, With Latch
Slot 2	PCIe 3.0 x1, Half Height, Half Length, 25W
Slot 3	PCIe 3.0 x4, Half Height, Half Length, 45W, With Latch

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 throughput will vary depending on the type and quantity of USB devices used.

Rear I/O

USB	4 x USB 3.2 Gen 1 Type-A 5Gb/s
Audio	1 x Rear (Line Out); Retaskable to 5.1
DisplayPort	2 x Standard (CPU dependent) Optional 1 x Rear Port (CPU dependent)
HDMI	Optional 1 x Rear Port (CPU dependent)
Type-C	Optional 1 x Rear Port (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	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 PCIe4 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 throughput will vary depending on the type and quantity of USB devices used.

Ethernet

Vendor	Intel Jacksonville I219LM
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	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 4 Channel ADC supports 16/20/24 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	380W
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	5A
Graphics	Not Available
Power Supply Fan	Yes
ENERGY STAR® Qualified (config dependent)	Yes
80 PLUS Compliant	Yes
Built-in Self Test (BIST) LED	No
Aux Power Drop	No

BIOS

Vendor	AMI
Self-Healing BIOS	Yes

Chassis Information

Color	Raven Black
PSU	380W Available, Autosensing, 80 PLUS Platinum Qualified
Thermal Solutions	Two System Fans Standard (1 front, 1 rear), One Fan per CPU, One PSU Fan
Dimensions	92.5mm/3.6" H 309.7mm/9.3" D 339.5mm/13.4" W
Weight	5.01kg / 11lbs

Packaging Dimensions

Height (mm/in)	530mm / 20.87"
Width (mm/in)	195mm / 7.68"
Depth (mm)	395mm / 15.55"
Weight (kgs/lbs)	7.43kg / 16.38lbs

Security & Serviceability

TPM	Infineon SLB9670 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	Yes

and/or mouse	
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: 10°C to 35°C (50°F to 95°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 Rocket Lake Xeon W-1300 Series/Core Series
Socket Type	Socket-H4 (LGA 1200)
Memory Support	DDR4 up to 3200MHz UDIMM Memory (ECC and non-ECC)
Voltage Regulator	125W TDP Capable
Chipset (PCH)	Intel W580 Chipset
Flash	32MB
Super I/O	Nuvoton NCT6692D
Clock	Intel Native isCLK
Audio	Realtek ALC623-CG Codec
Ethernet	Intel Jacksonville I219LM

Supported Components

Processor Level	Intel Rocket Lake - Xeon	Intel Rocket Lake - Core	Intel Comet Lake - Core
Processor	W-1390 W-1370 W-1350	i9-11900 i7-11700 i5-11600 i5-11500 i5-11400	i9-10900 i7-10700 i5-10500 i5-10400 i3-10325 i3-10305 i3-10105
Memory Type	ECC UDIMMs - 3200MHz	non-ECC UDIMMs - 3200MHz	non-ECC UDIMMs - 3200MHz
Memory	8GB DDR4 ECC UDIMM PC4-3200 16GB DDR4 ECC UDIMM PC4-3200 32GB DDR4 ECC UDIMM PC4-3200	8GB DDR4 non-ECC UDIMM PC4-3200 16GB DDR4 non-ECC UDIMM PC4-3200 32GB DDR4 non-ECC UDIMM PC4-3200	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)
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)	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 1024GB M.2 PCIe SSD, Gen 4 x4, NVMe, NON-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
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.

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

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 2.0 Cable Adapter Rear Dual Port USB 3.2 Gen 2 Type-C 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 (for NVMe SSD)

SECTION III: Supported Component Detail

CPU Specifications

CPU	Intel Xeon W-1390P (platform of reference 125W CPU on SFF form wave 2)	Intel Xeon W-1370P (platform of reference 125W CPU on SFF form wave 2)	Intel Xeon W-1350P (platform of reference 125W CPU on SFF form wave 2)	Intel Xeon W-1390	Intel Xeon W-1370	Intel Xeon W-1350	Intel Core i9-11900K (platform of reference 125W CPU on SFF form wave 2)	Intel Core i7-11700K (platform of reference 125W CPU on SFF form wave 2)	Intel Core i5-11600K (platform of reference 125W CPU on SFF form wave 2)	Intel Core i9-11900	Intel Core i7-11700	Intel Core i5-11600	Intel Core i5-11500	Intel Core i5-11400	Intel Core i3-110325	Intel Core i3-110305	Intel Core i3-110105	Intel Core i9-110900K	Intel Core i9-110900	Intel Core i7-110700K	Intel Core i7-110700
# of Cores	8c	8c	6c	8c	8c	6c	8c	6c	8c	6c	6c	6c	4c	4c	4c	10c	10c	8c	8c	6c	6c
# of Threads	16	16	12	16	16	12	16	12	16	12	12	12	8	8	8	20	20	16	16	12	12
Processor Base Frequency	3.5GHz	3.6GHz	4.0GHz	2.8GHz	2.9GHz	3.3GHz	3.5GHz	3.6GHz	3.9GHz	2.5GHz	2.5GHz	2.8GHz	2.7GHz	3.9GHz	3.8GHz	3.7GHz	3.7GHz	2.8GHz	3.8GHz	2.9GHz	3.0GHz
Max Turbo Frequency	5.3	5.2	5.1G	5.2	5.1G	5.0	5.3	5.0	4.9	5.2	4.9	4.8	4.6	4.7	4.5	4.4	5.2	5.1G	5.1G	4.8	4.7

	G H Z	G H Z	H Z	G H Z	H Z	G H Z	G H Z	G H Z	G H Z	G H Z	G H Z	G H Z	G H Z	G H Z	G H Z	G H Z	G H Z	H Z	H Z	G H Z	
Cache	1 6 M	1 6 M	1 2 M	1 6 M	1 6 M	1 2 M	1 6 M	1 6 M	1 2 M	1 6 M	1 6 M	1 2 M	1 2 M	1 2 M	8 M	8 M	6 M	2 0 M	2 0 M	1 6 M	1 6 M
TDP	12 5 W	12 5 W	12 5 W	8 0 W	8 0 W	8 0 W	12 5 W	12 5 W	12 5 W	6 5 W	6 5 W	6 5 W	6 5 W	6 5 W	6 5 W	6 5 W	6 5 W	6 5 W	6 5 W	12 5 W	

HDD Specifications

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"	6TB SATA - 7200rpm, 6Gb/s, 3.5"
3.5" SATA Hard Disk Drive (HDD)	Not Available	Yes	Yes	Yes	Yes	Yes
2.5" SATA Hard Disk Drive (HDD)	Yes	Not Available	Not Available	Not Available	Not Available	Not Available
Connector	SATA	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	7,200
Power Off to Spindle Stop (sec)	NA	NA	NA	NA	NA	NA
DC Power to Drive Ready (sec)	3.5	<10.0	<17.0	<17.0	<17.0	<17.0
Average Latency (msec)	4.2	4.16	4.16	4.16	4.16	4.16
Input (VDC)	5	5	5	5	5	5
Typical (Watts)	1.9	6.19	10.09	6.7	11.33	1318
Idle (Watts)	0.7	4.6	4.86	4.5	5.45	6.21
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	101.85mm x 147mm x 26.1mm
Weight (grams)	90	420	620	535	650	716
Operating (C) Ambient	0 to 60	0 to 60	5 to 60	0 to 60	5 to 60	5 to 60
Operating (C) Base Casting	60	60	60	60	60	60
Non-Operating (C) Ambient	(-40 to 70)	(-40 to 70)	(-40 to 70)	(-40 to 70)	(-40 to 70)	(-40 to 70)
Gradient (C per Hour)	20	20	20	20	20	20
Operating (Gs @ 2ms)	400	70	Read 70 Gs / Write 40 Gs	80	Read 70 Gs / Write 40 Gs	Read 70 Gs / Write 40 Gs

Non-Operating (Gs @ 2ms)	1000	350	300	300	300	250
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)	NVMe 2280 M.2 1TB PCIe SSD (non-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	22 x 80 x 3
Interface Type	PCIe Gen 4x4	PCIe Gen 4x4	PCIe Gen 4x4	PCIe Gen 4x4	PCIe Gen 4x4
Power Active (AVG)	5.8W	5.8W	5.8W	5.8W	5.8W
Power Idle	35 mW	35 mW	35 mW	35 mW	35 mW
Typical Sequential Read	5000 MB/s	6000 MB/s	6400 MB/s	6400 MB/s	6400 MB/s
Typical Sequential Write	1600 MB/s	3200 MB/s	3800 MB/s	5000 MB/s	3800 MB/s
Burst Random Read (4K Queue Depth 32/8 thread);	250K IOPS	500K IOPS	550K IOPS	550K IOPS	550K IOPS
Burst Random Write (4K Queue Depth 32/8 thread)	200K IOPS	370K IOPS	400K IOPS	400K IOPS	400K 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	300 TB
Mean Time Between Failures (MTBF)	2.0M POH	2.0M POH	2.0M POH	2.0M POH	2.0M POH
Hardware Encryption	AES 256 bit	AES 256 bit	AES 256 bit	AES 256 bit	Not Available
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/C D-RW Drive (SATA)-No OS/Linux	9mm Slim DVD Burner/C D-RW Drive (SATA)-Win10	9mm Slim Blu-Ray ODD DVD Burner (SATA)-No OS/Linux	9mm Slim Blu-Ray ODD DVD Burner (SATA)-Win10

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	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)	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	Intel UHD Graphics 630
Display Interface	1x DP 1.4, 1x HDMI 2.0	1x DP 1.2, 1x HDMI 1.4
Video Resolution (max)	5120 x 3200 @60Hz (DP) ,4096x2160@60Hz (HDMI)	4096x2304 @ 60Hz (DP), 4096x2304 @ 24Hz (HDMI)
Disclaimers		

Discrete Graphics Adapter

Adapter	Quadro T400	Quadro T600	Quadro T1000	WX3200
Bus Interface	PCIe 3.0 x16	PCIe 3.0 x16	PCIe 3.0 x16	PCIe 3.0 x8
Display Interface	3 x mDP 1.4a	4 x mDP 1.4a	4 x mDP 1.4a	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	Dev team, pls help to fill in
Memory Size	2GB GDDR6	4GB GDDR6	4GB GDDR6	4GB GDDR5
Memory Interface	64-bit	128-bit	128-bit	128-bit
Memory Bandwidth	Up to 80GB/s	Up to 160GB/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	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	
Thermal Solution	Ultra-quiet Active Fansink	Ultra-quiet Active Fansink	Ultra-quiet 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	6.6" L, single slot
Advanced Display	Not Available	Not Available	Not Available	Not Available
SLI/NVLink Support	Not Available	Not Available	Not Available	Not Available
Disclaimers				

Intel® Ethernet Specifications

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 BN8E8 8 1000M PCIe1 noASF - FH/LP	Intel® I350-F2 Dual Ports PCIe4 Gigabit Ethernet Adapter	Aquantia PCIe4 10GbE AQN-107 Gigabit Ethernet Adapter	2 x 2 AX WiFi with BT (M.2) vPro AX201-TWR/SFF	Bitland BN8E8 8 1000M PCIe1 noASF - FH/LP
Supplier PN	I210T1, MM# 941033	I350T2G1P2 0, MM# 928941	I350T4G1P2 0, MM# 928942	I218-00934/1218-00933	AQN-107-124-SBL			
Data Rates Supported	10/100/1000Mbps copper	10/100/1000Mbps (Copper), 1000Mbps (Fiber)	10/100/1000Mbps (Copper), 1000Mbps (Fiber)	10M, 100M, and 1000M	10/100/1000Mbps (Fiber),	10G/5G/2.5G/1G/100Mbps		
Controller Details	Intel® Ethernet Controller I210	Intel Ethernet Controller I350	Intel Ethernet Controller I351	REALTEK RTL8168E-VB-CG	AQC107			
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	PCIe Gen3			
Data Transfer Mode	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet		
Power Consumption	0.81W	Copper: I350-T2 V2= 4.4W	Copper: I350T4V2= 5W	RTL8168E=0 .53W	I350-F2= 5.5W			

		Fiber: I350-F2= 5.5W	LC-Fiber: I350F4= 6W			
IEEE Standards Compliance	IEEE 802.3/10B ASE-T, 100BASE-TX, 1000BASE-T	IEEE 802.3/10B ASE-T, 100BASE-TX, 1000BASE-T	IEEE 802.3/10B ASE-T, 100BASE-TX, 1000BASE-T	IEEE 802.1P Layer 2 Priority Encoding IEEE 802.1Q VLAN tagging IEEE 802.3az Draft 3.2 (EEE)	IEEE 802.3/10B ASE-T, 100BASE-TX, 1000BASE-T	IEEE802.3 an 10GBASE-T/5GBASE-T/2.5GBASE-T/1000BASE-T/100BASE-T/100BASE-TX
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	PXE boot, Intel iSCSI Remote Boot for Windows, Linux and Vmware, Intel BootAgent Software via PXE or BootP, WDMs or UEFI	PXE boot UEFI boot
Network Transfer Mode (Full/Half Duplex)	Supported	Supported	Supported	Supported	Supported	Supported
Network Transfer Rate	1,000Mbps Full Duplex	1,000Mbps Full Duplex	1,000Mbps Full Duplex	1,000Mbps Full Duplex	1,000Mbps Full Duplex	10Gbps Full Duplex
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	Windows 7/8/10, Linux, Free BSD, XEN,Vmware	Microsoft® Windows® 10, 8.1, 8, 7 (32/64-bit), and Linux 3.2, 3.10, 3.12, 4.2, and 4.4 drivers
Manageability	Supported	Supported	Supported	Supported	Supported	Supported
Manageability Capabilities Alerting	Supported	Supported	Supported	Supported	Supported	Supported
TDP	Firmware Based Thermal Management	Firmware Based Thermal Management	Firmware Based Thermal Management	Not Available	Firmware Based Thermal Management	Firmware Based Thermal Management
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, 50 °C (32 ° F to 122 ° F)	0°C to 55°C (32°F to 131°F)	0°C - 108°C
# of Ports	1	2	4	1	1	1
Data Rate Per Port	10/100/1000Mbps (copper)	10/100/1000Mbps (copper), 1000Mbps (fiber)	10/100/1000Mbps (copper), 1000Mbps (fiber)	10M, 100M, and 1000M	10/100/1000Mbps (fiber)	10G/5G/2.5G/1G/100Mbps

System Interface Type	PCIe Gen 2.1	PCIe Gen 2.1	PCIe Gen 2.1	PCI Express 1.1	PCIe Gen 2.1	PCIe Gen3 x4
NC Sideband Interface	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Jumbo Frames Supported	Yes	Yes	Yes	Yes	Yes	Yes
1000Base-T	Yes	Yes	Yes	Yes	Yes	Yes
MACsec IEEE 802.1 AE	Supported					
IEEE 1588	Supported	Supported	Supported	Not Available	Supported	Supported
Supported Under vPro	Not Available	Not Available	Not Available	Not Available	Not Available	Not
Disclaimers						

Ethernet

Model	i210-T1	i350-T2	i350-T4	Bitland BN8E88 1000M PCIe1 noASF - FH/LP	Intel® I350-F2 Dual Ports PCIe4 Gigabit Ethernet Adapter	Aquantia PCIe4 10GbE AQN-107 Gigabit Ethernet Adapter	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	LC Fiber Optic	1xRJ45	
Website	i210 T1		i350 T2		i350 T4		IC Datasheet
Auto-Negotiation	IEEE* 802.3* Auto-negotiation	IEEE* 802.3* Auto-negotiation	IEEE* 802.3* Auto-negotiation	Auto-Negotiation with Next Page capability	IEEE* 802.3* Auto-negotiation	IEEE* 802.3* Auto-negotiation	
Intel® vPro™	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	
Intel® Stable Image Platform Program (SIPP)	Not Available						
Intel® Standard Manageability	Supported	Supported	Supported	Not Available	Supported		
Power Optimizer Platform Low-power Management Systems	Supported	Supported	Supported	Supported	Supported		
Energy Efficient Ethernet	Supported	Supported	Supported	Supported	Supported	Supported	
TCP/UDP Checksum and Segmentation Offload (IPv4 and IPv6)	Supported	Supported	Supported	Supported	Supported		
Receive Side Scaling	Supported	Supported	Supported	Supported	Supported	Supported	
Dual Tx and Rx Queues	Yes	Yes	Yes	Not Available	Yes		

Jumbo Frames (up to 9KB)	Supported	Supported	Supported	Supported	Supported	Supported (Up to 16KB)
Teaming	Supported	Supported	Supported	Supported	Supported	Supported
Wake from Deep Sx	Supported	Supported	Supported	Supported	Supported	Supported
Server Operating System Support	Windows Server 2008, 2012, 2016. 2019 Linux (RHEL/SL ES), Free BSD, Xen, Vmware	Windows Server 2008, 2012, 2016. 2019 Linux (RHEL/SL ES), Free BSD, Xen, Vmware	Windows Server 2008, 2012, 2016. 2019 Linux (RHEL/SL ES), Free BSD, Xen, Vmware	Windows Server 2008, 2012, 2016. 2019 Linux (RHEL/SL ES), Vmware	Windows Server 2008, 2012, 2016. 2019 Linux (RHEL/SL ES), Free BSD, Xen, Vmware	Microsoft® Windows® 10, 8.1, 8, 7 (32/64-bit), and Linux 3.2, 3.10, 3.12, 4.2, and 4.4 drivers
Network Proxy/ARP Support	Supported	Supported	Supported	Supported	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	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	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	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

Acoustic Noise Emissions Declaration

LWAd(bels) Idle	4.3
LWAd(bels) Oper	4.8

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
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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

Materials Used

TCO Certification	9.0
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