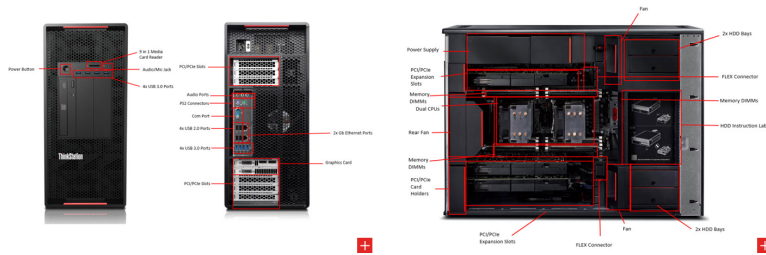


# Lenovo ThinkStation P910

Version: 3 | March 1, 2018



## Section I: System Overview

The ThinkStation P910 is high performance dual socket workstation. An Intel® Grantley-based product, the P910 provides excellent performance and quality for applications where processor, memory, graphics, and storage requirements are critical.

The P910 is positioned above two Grantley-based workstations, the single socket P510 and dual socket P710.

<b>Description</b>	The ThinkStation P910 is high performance dual socket workstation. An Intel® Grantley-based product, the P910 provides excellent performance and quality for applications where processor, memory, graphics, and storage requirements are critical. The P910 is positioned above two Grantley-based workstations, the single socket P510 and dual socket P710.
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## Operating Systems

<b>Preloaded</b>	Genuine Windows 10® Professional 64-bit Genuine Windows 10DG to 7® Professional 64-bit Genuine Windows 10® 64-bit
<b>Supported</b>	Red Hat Enterprise Linux 7

## Motherboard

### Form Factor

<b>Board Size</b>	13.15" x 14.9" (334mm x 378.5mm)
<b>Layout</b>	Custom ATX

### Motherboard Core

<b>Processor Support</b>	Intel® Xeon™ Quad Core (Broadwell EP) Intel® Xeon™ Six Core (Broadwell EP) Intel® Xeon™ Eight Core (Broadwell EP) Intel® Xeon™ Ten Core (Broadwell EP) Intel® Xeon™ Twelve Core (Broadwell EP) Intel® Xeon™ Fourteen Core (Broadwell EP) Intel® Xeon™ Sixteen Core (Broadwell EP) Intel® Xeon™ Twenty-Two Core (Broadwell EP) Intel® Xeon™ Six Core (Haswell EP)
<b>Socket Type</b>	Socket-R3 (LGA 2011)
<b>Memory Support</b>	1600/1866/2133/2400 MHz
<b>QPI (GTPS)</b>	6.4/8.0/9.6 GTPS Links
<b>Voltage Regulator</b>	Intel VR12.5 - 145W TDP Capable

<b>Chipset (PCH)</b>	Wellsburg (Intel 612)
<b>HW Monitor</b>	
<b>Flash</b>	16MB + Depoped 16MB
<b>Super I/O</b>	Nuvoton NCT6683D
<b>Clock</b>	Wellsburg (Intel 612) Native isCLK
<b>Audio</b>	Realtek ALC662
<b>Ethernet</b>	Intel Clarkville WGI218LM
<b>SAS</b>	Optional via Flex Adapter

#### Memory

<b>Slots</b>	16 total Slots, 8 per CPU
<b>Channels</b>	4 Channels per CPU
<b>Type</b>	DDR4 288-Pin, 1600/1866/2133/2400 MHz RDIMM and LRDIMM support
<b>ECC Support</b>	YES
<b>Speed</b>	Up to 2400 MHz
<b>Max DIMM Size</b>	Up to 32GB RDIMM, 64GB LRDIMM
<b>Max System Memory</b>	Up to 1TB LRDIMM (w/ 64GB)

#### Ethernet

<b>Vendor</b>	Intel, Clarkville WGI210AT/WGI218LM
<b>Count</b>	2
<b>EEPROM</b>	None for Clarkville
<b>Speeds</b>	10/100/1000 Mbps
<b>Functions</b>	PXE, ASF, WOL, Jumbo Frames, Teaming
<b>Connectors</b>	(2) x RJ45 on Rear I/O

#### Audio

<b>Vendor</b>	Realtek
<b>Type</b>	HD (5.1)
<b>Internal Speaker</b>	Yes, using SSM2211 amplifier
<b>Connectors</b>	(3) x Rear 3.5mm Jacks (Line In, Line Out, Microphone In) Global Headphone Jack (Headphone + MIC in) (1) x 2-Pin Internal Speaker Header
<b>Chipset</b>	
<b>Stereo Conversion</b>	
<b>High Definition Stereo Support</b>	
<b>Number of Channels</b>	
<b>Number of Bits/Audio Resolution</b>	
<b>Sampling Rate (Recording/Playback)</b>	
<b>Signal to Noise Ratio</b>	
<b>Wavetable Voices</b>	
<b>Analog Audio</b>	
<b>Dolby Digital</b>	

<b>THX</b>	
<b>Digital Out (S/PDIF)</b>	
<b>Speaker Power Rating</b>	

#### Video

<b>Onboard</b>	
<b>Adapter</b>	(3) x PCI-E 3.0 16-Lane Slots Additional adapters may be supported in x4 slots for Spec Bids
<b>Multi-GPU Support</b>	BIOS supported, card dependent
<b>Type</b>	
<b>Bus Interface</b>	
<b>Display Interface</b>	
<b>Video Resolution (max)</b>	
<b>Graphics Cover Name</b>	

#### Storage

<b>Floppy</b>	None
<b>IDE</b>	None
<b>SATA</b>	(8) x SATA Connectors, Gen. 3 4 SATA HDD ports connected through 2 Mini SAS HD (X2 electrical, X4 mechanical) (2 HDDs upper bay, 2HDDs lower bay) + 2 SATA Gen 3 for ODDs + 1SATA for Mez Connector
<b>eSATA</b>	(1) x eSATA Connector, Gen. 3 (Optional eSATA bracket)

#### Slots

<b>Slot 1</b>	
<b>Slot 2</b>	
<b>Slot 3</b>	
<b>Slot 4</b>	PCIe x1, gen 2, Open Ended, CPU1, Full Length, FH
<b>Slot 5</b>	PCIe x4, gen 2, Open Ended, CPU1, Half Length, FH
<b>Slot 6</b>	PCIe x16, gen 3, with Latch, CPU2, Full Length, FH ("Half length with Flex Adapters / Full length without Flex Adapter")
<b>Slot 7</b>	PCIe x16, gen 3, with Latch, CPU2, Full Length, FH
<b>Slot 8</b>	PCIe x4, gen 2, Open Ended, CPU2, Full Length, FH

#### I/O Front Default Ports

<b>USB 3.0 Type A</b>	
<b>Headset</b>	
<b>Headphone</b>	
<b>Microphone</b>	
<b>9-in-1 Media Card Reader</b>	

#### I/O Front Optional Ports

<b>Flex Module</b>	
<b>9-in-1 Media Card Reader</b>	
<b>29-in-1 Media Card Reader</b>	

**I/O Rear Default Ports**

<b>USB 2.0 Type A</b>	
<b>USB 3.0 Type A</b>	
<b>Display Port</b>	
<b>VGA Port</b>	
<b>1 standard serial, 1 optional via punching out</b>	
<b>Audio In</b>	
<b>Audio Out</b>	
<b>Microphone</b>	
<b>RJ45</b>	
<b>2 PS/2</b>	

**I/O Rear Optional Ports**

<b>2 PS/2</b>	
<b>1 standard serial, 1 optional via punching out</b>	
<b>IEEE 1394</b>	
<b>eSATA</b>	
<b>Parallel Card</b>	
<b>Dual USB 3.1 Type C Card</b>	
<b>Dual USB 2.0 Type A card</b>	
<b>Single/Dual Port Network Card</b>	
<b>Single/Dual/Quad Port Network Card</b>	

**Thermal**

<b>Temp Sensors</b>	Ambient Thermal Sensor - Thermal diode Connected to Super I/O VR1 Thermal Sensor - Thermal diode Connected to Super I/O VR2 Thermal Sensor- Thermal diode Connected to Super I/O PSU Thermal Sensor
<b>Fans</b>	CPU Fan 4-pin header with 3-pin key Rear SYSTEM Fan X2 4-pin header with 4-pin key Front Fan 4-pin header with 4 pin key ODD bay Fan X2 4-pin header with 3-pin key PSU Fan Main PSU power connector

**Power Connectors**

<b>Main</b>	Single Card Edge Connector
<b>Memory &amp; CPU</b>	
<b>Graphics</b>	

**Security**

<b>TPM</b>	Version 1.2, Infineon SLB9660TT1.3
<b>Asset ID</b>	Yes, 1024X8bit, might depoped in future
<b>vPro</b>	Intel vPro for WS (AMT 9.x)

**BIOS**

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<b>Vendor</b>	AMI
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### Chassis Information

<b>Format</b>	55L Rack Mountable Tower
<b>Color</b>	
<b>PSU</b>	
<b>Thermal Solutions</b>	
<b>Dimensions</b>	440mm H x 200mm W x 620mm D (chassis only)446mm H x 200mm W x 620mm D (with rear handle & feet)
<b>Weight</b>	71.3lbs

### Packaging Parameters without External Speaker

<b>Height (mm)</b>	
<b>Height (inch)</b>	
<b>Width (mm)</b>	
<b>Width (inch)</b>	
<b>Depth (mm)</b>	
<b>Depth (inch)</b>	
<b>Weight (kgs)</b>	
<b>Weight (lbs)</b>	

### Security & Serviceability

<b>Hardware Maintenance Manual</b>	
<b>Drivers &amp; Software</b>	
<b>Access Panel</b>	Tool-less side cover removal
<b>Optical Drive</b>	Tool-less
<b>Hard Drives</b>	Tool-less
<b>Expansion Cards</b>	Tool-less
<b>Processor Socket</b>	Tool-less
<b>Color coded User Touch Points</b>	Yes
<b>Color-coordinated Cables and Connectors</b>	Yes
<b>Memory</b>	Tool-less
<b>System Board</b>	Tool-less
<b>Green Color Power LED on Front of Computer</b>	Yes
<b>Restore CD/DVD/USB Set</b>	Restore system to original factory shipping image - Can be obtained via Lenovo Support
<b>Cable Lock Support</b>	Yes, Optional Kensington Cable Lock
<b>Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control</b>	Yes
<b>Power-On Password</b>	Yes
<b>Setup Password</b>	Yes
<b>NIC LEDs (integrated)</b>	Yes

<b>Security Chip</b>	Yes
<b>Access Panel Key Lock</b>	Optional
<b>Boot Sequence Control</b>	Yes
<b>Padlock Support</b>	Yes, loop in rear for optional padlock, prevents side panel removal
<b>Boot without keyboard and/or mouse</b>	Yes

## Operating Environment

<b>Air Temperature</b>	Operating: 10°C to 35°C (50°F to 95°F) 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
<b>Storage</b>	
<b>Humidity</b>	Relative Humidity Operating: 10% to 80% (non-condensing) Relative Humidity Storage/Transit: 10% to 90% (non-condensing) Wet Bulb Temperature Operating: 25°C max Wet Bulb Temperature Non-operating: 40°C max
<b>Altitude</b>	Operating: -15.2 m to 3048 m (-50 ft to 10 000 ft)
<b>Vibration</b>	
<b>Shock</b>	

## Regulations & Standards

### EMC & Safety

<b>EMC</b>	FCC (DoC)/Canada CE (EMC) VCCI JEIDA C-Tick BSMI CCIB
<b>Safety</b>	FCC (DoC)/Canada CE (EMC) VCCI JEIDA C-Tick BSMI CCIB PSB CE (LVD)

### Environmentals

<b>Energy Star</b>	Energy Star Program Requirements for Computers: Version 6.0 (select models)
<b>EPEAT</b>	ErP Lot-6 2014 (via system setup option; default on for systems shipped to EMEA.)
<b>ErP Lot-3 2013</b>	
<b>Hazardous Substances</b>	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/cm <sup>2</sup> /week.

## Section II: Supported Components

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<b>Processor</b>	
<b>Memory Specifications</b>	RDIMMs - 2400MHz 8GB DDR4 ECC RDIMM PC4-2400-R 2Rx8 16GB DDR4 ECC RDIMM PC4-2400-R 2Rx4 32GB DDR4 ECC RDIMM PC4-2400-R 2Rx4 LRDIMMs - 2400MHz 64GB DDR4 ECC LRDIMM PC4-2400-L 4Rx4
<b>Notes</b>	When ordering two processors, the second processor must be the same as the first. Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families. Multi core technologies are designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefits; check with software provider to determine suitability; not all customers or software applications will necessarily benefit from use of these technologies. 64-bit computing on Intel® 64 architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel® 64 architecture. Processors will not operate (including 32-bit operation) without an Intel® 64 architecture-enabled BIOS. Performance will vary depending on your hardware and software configurations

## Storage

<b>Notes</b>	
<b>3.5" SATA Hard Disk Drive (HDD)</b>	500GB SATA - 7200rpm, 6Gb/s, 3.5" 1TB SATA - 7200rpm, 6Gb/s, 3.5" 2TB SATA - 7200rpm, 6Gb/s, 3.5" 3TB SATA - 7200rpm, 6Gb/s, 3.5"
<b>3.5" Enterprise SASA Hard Disk Drive (HDD)</b>	4TB SATA - 7200rpm, 6Gb/s, 3.5" 6TB SATA - 7200rpm, 6Gb/s, 3.5"
<b>3.5" Hybrid Drive</b>	1TB SATA - 7200rpm, 6Gb/s, 3.5" Hybrid
<b>2.5" SAS Hard Disk Drive (HDD)</b>	300GB SAS - 10000rpm, 12Gb/s, 2.5" 600GB SAS - 10000rpm, 12Gb/s, 2.5" 600GB SAS - 15000rpm, 12Gb/s, 2.5"
<b>2.5" SATA Hard Disk Drive (HDD)</b>	
<b>2.5" SATA Solid State Drive (SSD)</b>	128GB SATA SSD, 6Gb/s, , 2.5" Non-OPAL 256GB SATA SSD, 6Gb/s, , 2.5" Non-OPAL 256GB SATA SSD, 6Gb/s, , 2.5" OPAL 512GB SATA SSD, 6Gb/s, , 2.5" Non-OPAL 1 TB SATA SSD , 6Gb/s, , 2.5" Non-OPAL 180GB SATA SSD, 6Gb/s, , 2.5" OPAL 240GB SATA SSD, 6Gb/s, , 2.5" OPAL 480GB SATA SSD, 6Gb/s, , 2.5" OPAL
<b>M.2 (NGFF) PCIe Solid State Drive (SSD)</b>	256 GB M.2 PCIe - Solid State Drive (SSD), Gen3x4, OPAL NVMe 512 GB M.2 PCIe - Solid State Drive (SSD), Gen3x4, NVMe
<b>2.5" PCIe Solid State Drive (SSD)</b>	400GB PCIe -Intel 750 2.5" PCIe Gen 3x4 NVMe
<b>PCIe Half Height / Half Length Solid State Drive (SSD)</b>	400GB PCIe - Intel P3700 PCIe Gen 3x4 NVMe,Non-Opal
<b>Intel Optane Memory Technology</b>	

## RAID

<b>RAID</b>	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 support RAID 0,1,5,10
<b>RAID Levels and Requirements</b>	RAID levels and requirements: RAID 0 (striping) provides increased performance by writing data across multiple drives. RAID 1 (mirroring) provides fault tolerance by writing the data on two drives. RAID 5 (striping with parity) uses distributed parity data to provide fault tolerance more efficiently than RAID 1. Requires three or more drives. RAID 10 (or RAID 1+0) combines RAID 1 and RAID 0 to create a stripe of mirrors that is fault tolerant while offering increased performance. Requires four drives.
<b>Optional Hard Disk Drive Controllers</b>	Optional Hard Disk Drive Controllers LSI 9364-8i 8-port SATA/SAS ROC Adapter(Base Mode) w/ 1GB DDR Memory Module LSI SAS/SATA RAID Flex adapter

Intel Virtual Raid	
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### Optical Drive/Removable Media

<b>DVD-ROM Drive</b>	DVD-ROM Drive - 16x/48x (SATA)
<b>DVD Burner/CD-RW Rambo Drive</b>	DVD Burner/CD-RW Rambo Drive (SATA)
<b>Blu-Ray Burner Drive</b>	Blu-Ray Burner Drive w/AACS encryption (SATA)
<b>DVD Burner/CD-RW Rambo Drive (Slim SATA)</b>	DVD Burner/CD-RW Rambo Drive (9.5mm Slim SATA)
<b>Slim 9.0mm DVD ROM</b>	
<b>Media Card Reader</b>	Front 9 in 1 Media Card reader Standard Front 29 in 1 Media card reader, USB3.0, MPOB, 760mm (Requires FLEX Module)
<b>Keyboard</b>	Preferred Pro Fullsize Keyboard (USB) Preferred Pro Fullsize Keyboard (PS/2) Smart Card KYB Chicony KUF1256 fingerprint KB Win8 Lenovo Slim New F5 USB Keyboard
<b>Pointing Devices</b>	Optical Wheel Mouse (1000 DPI), USB - red wheel Lenovo USB Laser Mouse for win7 and win10 PS2 black optical mouse with new logo 3DConnexion CadMouse
<b>Fingerprint Reader</b>	
<b>Color Calibrator</b>	

### Graphics Cards

<b>Integrated Graphics</b>	<p>Nvidia NVS310 (DP x 2) - 1GB DDR3  Nvidia NVS310 (DP x 2) - 1GB DDR3  Nvidia NVS315 (with DMS-59 to Dual DVI single link dongle) - 1GB DDR3  Nvidia NVS315 (with DMS-59 to Dual Display Port dongle) - 1GB DDR3  Nvidia NVS 510 (mini DP x 4) - 2GB DDR3  NVS 810 (miniDPx8) - 4GB DDR3-ATX Long Offset Ext Bracket  Nvidia Quadro K420(DP/DVI) - 2GB DDR3- ATX  Nvidia Quadro K620 (DVI, DP) - 2GB DDR3 ATX  NVIDIA Quadro K1200(miniDPx4) - 4GB GDDR5 - HP  Nvidia Quadro K2200 (DVI, DP, DP) - 4GB GDDR5 ATX  Nvidia Quadro M2000 (Dp x 4) - 4GB ATX  Nvidia Quadro M4000 (DP x 4) - 8GB GDDR5- ATX Long Offset Ext Bracket  Nvidia Quadro M5000 (DVI, DP x 4) - 8GB GDDR5- ATX Long Offset Ext Bracket  Nvidia Quadro M6000 (Dual Link DVI, DPx4) - 24GB GDDR5 - Long Offset Extender  Nvidia Quadro P5000 (DVI-D,4xDP) - 16GB GDDR5 with Long extender Nvidia Quadro P6000 (DVI-D,4xDP) - 24GB GDDR5 with Long extender  NVIDIA Quadro P400(miniDP x3) - 2GB GDDR5 - HP  NVIDIA Quadro P600(miniDP x4) - 2GB GDDR5 - HP  NVIDIA Quadro P1000(miniDP x4) - 4GB GDDR5 - HP  NVIDIA Quadro P2000(DP x4) - 5GB GDDR5 - HP  NVIDIA Quadro P4000(DP x4) - 8GB GDDR5 - HP  Nvidia Quadro P5000 (DVI-D,4xDP) - 16GB GDDR5 with Long extender  Nvidia Quadro P6000 (DVI-D,4xDP) - 24GB GDDR5 with Long extender  NVIDIA SLI Implementations  2 x Nvidia Quadro M5000 with SLI cable  2 x Nvidia Quadro M6000 with SLI Cable  2 x Nvidia Quadro P4000 with SLI cable  2 x Nvidia Quadro P5000 with SLI cable  2 x Nvidia Quadro P6000 with SLI cable  NVIDIA GPU Computing Processor  NVIDIA Tesla K40C GPU Active Accelerator - 12GB GDDR5 Long Ext  Intel Parallel Coprocessor  Intel Xeon Phi Coprocessor 3120A - 57 Cores, 1.1 GHz, 6GB Cache, 300 W - PCIe x16, with long extender bracket  NVIDIA Stereo 3D Bracket  Nvidia Stereo 3D Connector Bracket</p>
<b>Discrete Graphic Cards</b>	
<b>NVIDIA Stereo 3D Bracket</b>	

### FLEX Components

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<b>Flex Components</b>	Flex Bay: Formerly known as ODD bays. Will support not only ODD, but also HDDs and Flex Module Flex Module: Module supported in the Flex Bay with several options integrated. Will support slim ODD, High Speed Media Card Reader or 2 universal ports supporting IEEE1394, eSATA, etc... Flex Connector: Mezzanine connector in the motherboard, that enables expanded storage and I/O. 2 available in P900, 1 available in P500/P700 Flex Tray: New HDD Tray design enables that two drives on a single tray (when used in a blind connect configuration)
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PCIe Adapters

<b>Network</b>	Intel I210-T1 Single Port Gigabit Ethernet Adapter Intel I350-T2 Dual Port Gigabit Ethernet Adapter Intel I350-T4 Quad Port Gigabit Ethernet Adapter Bitland BN8E88 1000M PCIE ASF FH
<b>Thunderbolt</b>	Intel Thunderbolt PCIe Add-In-Card
<b>IEE 1394</b>	IEEE 1394a (Firewire-400) PCI Express x1 Adapter (1 external, 1 internal port)
<b>USB</b>	USB 3.0 PCI Express x1 Adapter
<b>Audio Devices</b>	
<b>WIFI Cards</b>	Intel 7260 AC Wifi card
<b>WWAN</b>	
<b>Express Card</b>	
<b>Chassis Materials</b>	
<b>Parallel Card</b>	
<b>PCIe to M.2 Adapter Card</b>	
<b>Front Access Storage Enclosure</b>	
<b>Type C</b>	

**Section III: System Technical Specifications**

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Power Supply Specifications

<b>Power Supply</b>	1300W PSU
<b>Power Efficiency</b>	
<b>Operating Voltage Range</b>	90-264VAC
<b>Rated Voltage Range</b>	100-240V
<b>Rated Line Frequency</b>	50/60Hz
<b>Operating Line Frequency Range</b>	47Hz/63Hz
<b>Rated Input Current</b>	15A-9A
<b>Power Supply Fan</b>	(2) 60x38mm, 14000rpm max
<b>ENERGY STAR* qualified (Config Dependent)</b>	*System level select models
<b>80 PLUS Compliant</b>	Yes 80 PLUS Platinum
<b>Built-in Self Test (BIST) LED</b>	YES
<b>Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)</b>	YES
<b>Aux Power Drop</b>	Quad Drop

ThinkStation Power Calculator

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## BIOS Specifications

## Features

<b>WMI Support</b>	Compliant with Microsoft WBEM and the DMTF Common Information Model
<b>ROM-Based Setup Utility (F1)</b>	System Configuration Setup program available at power-on with F1 key
<b>Bootblock Recovery</b>	Recovers system BIOS when Flash ROM corrupted.
<b>Replicated Setup</b>	Saves System Configuration settings to file that can then be used replicated to other systems.
<b>Boot Control</b>	Boot control available through ROM-Based Setup Utility or with F12 key at power-on
<b>Memory Change Alert</b>	Power-on Error message in event of decrease in system memory
<b>Thermal Alert</b>	Power-on Error message in event of fan failure
<b>Asset Tag</b>	Support ability to set SMBIOS Type 2 Baseboard Asset Tag field.
<b>System/Emergency ROM Flash Recovery with Video</b>	Support process to recover system BIOS when Flash ROM corrupted
<b>Remote Wakeup/Remote Shutdown</b>	System admin can power on/off a client computer from remote location to provide maintenance
<b>Quick Resume Time</b>	Support for power S3 (suspend to RAM) and prompt resume times
<b>ROM Revision Level</b>	
<b>Keyboard-less Operation</b>	System can be booted without a keyboard
<b>Per-port Control</b>	Allows I/O ports to be individually enabled/disabled through ROM-based setup or WMI interface
<b>Adaptive Cooling</b>	Fans dynamically controlled by system BIOS based on temperature. User has ability to provide custom fan control table
<b>Security</b>	User and Administrator passwords can protect boot and ROM-based Setup. Chassis intrusion detection protect
<b>Intel(R) AMT (includes ASF 2.0)</b>	Allows system to be supported from a remote location
<b>Intel(R) TXT</b>	Intel(R) Trusted Execution Technology provides a security foundation to build protections against software base attacks.
<b>Memory Modes</b>	Supports mirroring, lock step, and sparing memory modes
<b>Windows 10 Ready</b>	Supports Windows 8 requirements – Secure flash, UEFI v 2.3.1 spec

## Industry Standard Specification Support

<b>UEFI</b>	Unified Extensible Firmware Interface v2.3.1d
<b>ACPI (Advanced Configuration and power Management Interface)</b>	Advanced Configuration and Power Interface v5.0
<b>ASF 2.0</b>	DMTF Alert Standard Format Specification v2.0
<b>ATA (IDE)</b>	AT Attachment 6 with Packet Interface (ATA/ATAPI-6)
<b>CD Boot</b>	"El Torito" Bootable CD-Rom Format Specification, Version 1.0
<b>EHCI</b>	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
<b>PCI</b>	
<b>PCI Express</b>	PCI Express Base Specification 3.0
<b>SATA</b>	Serial ATA Revision 3.0 Specification
<b>TPM</b>	Trusted Computing Group TPM Specification Version 1.2
<b>UHCI</b>	Universal Host Controller Interface Design Guide, Revision 1.1
<b>USB</b>	Universal Serial Bus Revision 1.1

	Universal Serial Bus v2.0 Universal Serial Bus v3.0
<b>SMBIOS</b>	DMTF System Management Spec v2.8.0
<b>XHCI</b>	

## Social and Environmental Responsibility

<b>Quality Control</b>	Lenovo is a member of an eco declaration system that enforces regular independent quality control
<b>Hazardous Substances and Preparation</b>	<p>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 B2)</p> <p>Products do not contain Asbestos</p> <p>Products do not contain Ozone Depleting Substances: Chlorofluorocarbons (CFC), hydrobromofluorocarbons (HBFC), hydrochlorofluorocarbons (HCFC), Halons, carbontetrachloride, 1,1,1-trichloroethane, methyl bromide</p> <p>Products do not contain more than; 0.005% polychlorinated biphenyl (PCB), 0.005% polychlorinated terphenyl (PCT) in preparation</p> <p>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</p> <p>Parts with direct and prolonged skin contact do not release nickel in concentrations above 0.6 microgram/cm<sup>2</sup>/week</p> <p>REACH Article 33 information about substances in articles is available at: <a href="http://www.lenovo.com/social_responsibility/us/en/ThinkGreen_products.html#environment">http://www.lenovo.com/social_responsibility/us/en/ThinkGreen_products.html#environment</a></p>
<b>Batteries</b>	<p>If the product contains a battery or an accumulator, it is labeled with the disposal symbol and if it contains more than 0.0005% of mercury (for button cells only) by weight, or more than 0.004% of lead, it shall be marked with the chemical symbol for the metal concerned, Hg or Pb. Information on proper disposal is provided in user manual</p> <p>Button cells used in the product do not contain more than 2% by weight of mercury. Other batteries or accumulators do not contain more than 0.0005% of mercury or 0.002% of cadmium</p> <p>Batteries and accumulators are easily removable by either users or service providers (as dependent on the design of the product). Exception: Batteries that are permanently installed for safety, performance, medical or data integrity reasons do not have to be "easily removable"</p>
<b>Safety, EMC Connection to the Telephone Network and Labeling</b>	<p>The product complies with legally required safety standards as specified</p> <p>The product complies with legally required standards for electromagnetic compatibility</p> <p>If product is intended for connection to a public telecom network or contains a radio transmitter, it complies with legally required standards for radio and telecommunication devices</p> <p>The product is labeled to show conformance with applicable legal requirements</p>
<b>Product Packaging</b>	<p>Packaging and packaging components do not contain more than 0.01% lead, mercury, cadmium and hexavalent chromium by weight of these together.</p> <p>Plastic packaging material is marked according to ISO 11469 referring ISO 1043</p> <p>The product packaging material is free from ozone depleting substances as specified in the Montreal Protocol</p> <p>For more information on Lenovo social environmental practices visit: <a href="http://www.lenovo.com/social_responsibility/us/en/ThinkGreen_products.html#environment">http://www.lenovo.com/social_responsibility/us/en/ThinkGreen_products.html#environment</a></p>

## Manageability

<b>Industry Standard Specifications</b>	This product meets the following industry standard specifications for manageability functionality: Intel LAN with AMT
<b>Remote Manageability Software Solutions</b>	Lenovo ThinkStation is supported on the following remote manageability software consoles: Lenovo ThinkManagement Console LANDesk Management Suite for ThinkVantage Technologies ( <a href="http://www.landesk.com/lenovo">www.landesk.com/lenovo</a> ) Microsoft System Center Configuration Manager
<b>System Software Manager</b>	Lenovo ThinkStation supports software management tools from the ThinkVantage System Update suite: System Update Update Retriever Thin Installer
<b>Service, Support, and Warranty</b>	On-site Warranty and Service: Three-years, limited warranty and service offering delivers on-site, next business-day service for parts and labor and includes free telephone support 8am - 5pm. Global coverage ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.

## Section IV: Component Specifications

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Display

HDD Specifications

3.5" SATA Hard Disk Drive (HDD)	3.5" Enterprise SATA Hard Disk Drive (HDD)	3.5" Hybrid Drive	2.5" SAS Hard Disk Drive (HDD)	2.5" SATA HDD
500GB SATA – 7200rpm, 6Gb/s, 3.5" 1TB SATA – 7200rpm, 6Gb/s, 3.5" 2TB SATA – 7200rpm, 6Gb/s, 3.5" 3TB SATA – 7200rpm, 6Gb/s, 3.5"	4TB SATA – 7200rpm, 6Gb/s, 3.5" 6TB SATA – 7200rpm, 6Gb/s, 3.5"	1TB SATA – 7200rpm, 6Gb/s, 3.5" Hybrid	300GB SAS – 10000rpm, 12Gb/s, 2.5" 600GB SAS – 10000rpm, 12Gb/s, 2.5" 600GB SAS – 15000rpm, 12Gb/s, 2.5"	

Storage Device Specifications

	<b>3.5 7200 Enterprise 4T/6T (Model:Makara)</b>	<b>3.5 7200 Enterprise 4T/6T (Model:MakaraBP)</b>	<b>2.5 10K SAS 300G/600G (Model:Thunderbolt)</b>
<b>Connector</b>	SATA	SATA	SAS
<b>Transfer Rate (Gb/sec)</b>	600MB/sec	600MB/sec	12Gb
	<b>2.5 15K SAS 600G (Model:Valkyrie BP)</b>	<b>3.5" 7200 2T/3T (Model:Grenada BP-R )</b>	<b>3.5" 7200 500G/1T (Model:Pharaoh Oasis)</b>
<b>Connector</b>	SAS	SATA	SATA
<b>Transfer Rate (Gb/sec)</b>	12Gb	600MB/sec	600MB/sec
	<b>3.5" 7200RPM Hybrid2T/1T (Model:Grenada BP2H )</b>		
<b>Connector</b>	SATA		
<b>Transfer Rate (Gb/sec)</b>	600MB/sec		

Performance

	<b>3.5 7200 Enterprise 4T/6T (Model:Makara)</b>	<b>3.5 7200 Enterprise 4T/6T (Model:MakaraBP)</b>	<b>2.5 10K SAS 300G/600G (Model:Thunderbolt)</b>
<b>Spindle Speed(RPM)</b>	7200	7200	10,000 +/-
<b>Power off to Spindle Stop(sec)</b>	23 max	23 max	20 sec
<b>DC Power to Drive Ready(sec)</b>	30 max	30 max	20 sec
<b>Receipt of Start Unit Command to Drive Ready(sec)</b>	30 max	30 max	20 sec
<b>Average Latency(msec)</b>	4.16	4.16	2
	<b>2.5 15K SAS 600G (Model:Valkyrie BP)</b>	<b>3.5" 7200 2T/3T (Model:Grenada BP-R )</b>	<b>3.5" 7200 500G/1T (Model:Pharaoh Oasis)</b>
<b>Spindle Speed(RPM)</b>	15,000 +/-	7200	7200
<b>Power off to Spindle Stop(sec)</b>	20 sec	11 max	10 max
<b>DC Power to Drive Ready(sec)</b>	20 sec	10 max	10 max
<b>Receipt of Start Unit Command to Drive Ready(sec)</b>	20 sec	17 max	10 max
<b>Average Latency(msec)</b>	2	4.16	4.16
	<b>3.5" 7200RPM Hybrid2T/1T (Model:Grenada BP2H )</b>		
<b>Spindle Speed(RPM)</b>	7200		
<b>Power off to Spindle Stop(sec)</b>	11 max		

DC Power to Drive Ready(sec)	
Receipt of Start Unit Command to Drive Ready(sec)	
Average Latency(msec)	4.16

#### Power Management

	3.5 7200 Enterprise 4T/6T (Model:Makara)	3.5 7200 Enterprise 4T/6T (Model:MakaraBP)	2.5 10K SAS 300G/600G (Model:Thunderbolt)
Input (VDC)	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%
Typical (Watts)	10.62(6T)	10(6T)	6.01
Idle (Watts)	8(6T)	6.2(6T)	3.44

	2.5 15K SAS 600G (Model:Valkyrie BP)	3.5" 7200 2T/3T (Model:Grenada BP-R )	3.5" 7200 500G/1T (Model:Pharaoh Oasis)
Input (VDC)	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%	+5v +- 5%+12v +- 5%
Typical (Watts)	8.03	8 max	5.57 max
Idle (Watts)	5.28	5.4 (Idle 2)	4.21

	3.5" 7200RPM Hybrid2T/1T (Model:Grenada BP2H )
Input (VDC)	+5v +- 5%+12v +- 5%
Typical (Watts)	6.7 max
Idle (Watts)	4.5 (Idle 2)

#### Dimensions

	3.5 7200 Enterprise 4T/6T (Model:Makara)	3.5 7200 Enterprise 4T/6T (Model:MakaraBP)	2.5 10K SAS 300G/600G (Model:Thunderbolt)
Height (mm - Max)	26.11	26.11	15
Width (mm)	101.6	101.6	69.85
Depth (mm - Max)	146.99	146.99	100.45
Weight (grams)	780 max	705 max	199 (maximum)

	2.5 15K SAS 600G (Model:Valkyrie BP)	3.5" 7200 2T/3T (Model:Grenada BP-R )	3.5" 7200 500G/1T (Model:Pharaoh Oasis)
Height (mm - Max)	15	26.1	20
Width (mm)	69.85	101.6	101.6
Depth (mm - Max)	100.45	146.99	146.99
Weight (grams)	230 (maximum)	626 max	415 max

	3.5" 7200RPM Hybrid2T/1T (Model:Grenada BP2H )
Height (mm - Max)	26.11
Width (mm)	101.6
Depth (mm - Max)	146.99
Weight (grams)	535

#### Temperature

	3.5 7200 Enterprise 4T/6T (Model:Makara)	3.5 7200 Enterprise 4T/6T (Model:MakaraBP)	2.5 10K SAS 300G/600G (Model:Thunderbolt)
Operating(C) Ambient	5 to 60	5 to 60	5 to 55

<b>Operating(C) Base Casting</b>			60 max
<b>Non-Operating(C) Ambient</b>	-40 to 70	-40 to 70	-40 to 70
<b>Gradient(C per Hour)</b>	20 max	20 max	20 max
	<b>2.5 15K SAS 600G (Model:Valkyrie BP)</b>	<b>3.5" 7200 2T/3T (Model:Grenada BP-R )</b>	<b>3.5" 7200 500G/1T (Model:Pharaoh Oasis)</b>
<b>Operating(C) Ambient</b>	5 to 55	0 to 60	0 to 60
<b>Operating(C) Base Casting</b>	60 max		
<b>Non-Operating(C) Ambient</b>	-40 to 70	-40 to 70	-40 to 70
<b>Gradient(C per Hour)</b>	20 max	30 max	30 max
	<b>3.5" 7200RPM Hybrid2T/1T (Model:Grenada BP2H )</b>		
<b>Operating(C) Ambient</b>	0 to 60		
<b>Operating(C) Base Casting</b>			
<b>Non-Operating(C) Ambient</b>	-40 to 70		
<b>Gradient(C per Hour)</b>	30 max		

#### Shock

	<b>3.5 7200 Enterprise 4T/6T (Model:Makara)</b>	<b>3.5 7200 Enterprise 4T/6T (Model:MakaraBP)</b>	<b>2.5 10K SAS 300G/600G (Model:Thunderbolt)</b>
<b>Operating(Gs @ 2ms)</b>	70(read) 40(write)	70(read) 40(write)	25
<b>Non-Operating(Gs @ 2ms)</b>	250 6T,300 other	250 6T,300 other	400
	<b>2.5 15K SAS 600G (Model:Valkyrie BP)</b>	<b>3.5" 7200 2T/3T (Model:Grenada BP-R )</b>	<b>3.5" 7200 500G/1T (Model:Pharaoh Oasis)</b>
<b>Operating(Gs @ 2ms)</b>	25	70 max	80 max
<b>Non-Operating(Gs @ 2ms)</b>	400	350 max	300 max
	<b>3.5" 7200RPM Hybrid2T/1T (Model:Grenada BP2H )</b>		
<b>Operating(Gs @ 2ms)</b>	80 max		
<b>Non-Operating(Gs @ 2ms)</b>	300 max		

#### SSD Specifications

	<b>1 TB SATA SSD, 6Gb/s, 2.5" Non-OPAL</b>	<b>128GB SATA SSD, 6Gb/s, 2.5" Non-OPAL</b>	<b>180GB SATA SSD, 6Gb/s, OPAL.2.5"</b>
<b>2.5" SATA Solid State Drive (SSD)</b>			
<b>M.2 (NGFF) PCIe Solid State Drive (SSD)</b>			
<b>M.2 PCIe &amp; SATA SSD</b>			
<b>PCIe Half Height / Half Length Solid State Drive (SSD)</b>			
	<b>240GB SATA SSD, 6Gb/s, OPAL. 2.5"</b>	<b>2 TB SATA SSD, 6Gb/s, 2.5" OPAL</b>	<b>256GB SATA SSD, 6Gb/s, 2.5" OPAL</b>
<b>2.5" SATA Solid State Drive (SSD)</b>			
<b>M.2 (NGFF) PCIe Solid State Drive (SSD)</b>			

M.2 PCIe & SATA SSD			
PCIe Half Height / Half Length Solid State Drive (SSD)			
	<b>256GB SATA SSD, 6Gb/s, 2.5" Non-OPAL</b>	<b>400GB PCIe - Intel 750 2.5"</b>	<b>480GB SATA SSD, 6Gb/s,OPAL. 2.5"</b>
2.5" SATA Solid State Drive (SSD)			
M.2 (NGFF) PCIe Solid State Drive (SSD)			
M.2 PCIe & SATA SSD			
PCIe Half Height / Half Length Solid State Drive (SSD)			
	<b>400GB PCIe - Intel P3700</b>		
2.5" SATA Solid State Drive (SSD)			
M.2 (NGFF) PCIe Solid State Drive (SSD)			
M.2 PCIe & SATA SSD			
PCIe Half Height / Half Length Solid State Drive (SSD)			

**Solid State Storage Devices**

	<b>1 TB SATA SSD, 6Gb/s, 2.5" Non-OPAL</b>	<b>128GB SATA SSD, 6Gb/s, 2.5" Non-OPAL</b>	<b>180GB SATA SSD, 6Gb/s, OPAL.2.5"</b>
<b>Supported Types</b>			
<b>Dimensions inches/centimeters (W x D x H)</b>			
<b>Size</b>			
<b>Interface Type</b>			
<b>Read/Write IOPS Specifications</b>			
<b>Bandwidth Performance</b>			
<b>Power Consumption (Max)</b>			
<b>Active(AVG)</b>			
<b>Idle</b>			
<b>Min MTBF</b>	1.5M hours	1.5 M hours	1.2 M hours
<b>Min Sequential Read</b>	560 MB/s	460 MB/s	540 MB/s
<b>Min Sequential Write</b>	510 MB/s	270 MB/s	490 MB/s
<b>Min Random Read (8GB Span)</b>	100000 IOPS	77000 IOPS	41000 IOPS
<b>Min Random Write (8GB Span)</b>	88000 IOPS	60000 IOPS	49000 IOPS
<b>Min Power - Active</b>	150 mW	155 mW	165 mW
<b>Min Power - Idle</b>	70 mW	75 mW	55 mW
<b>Min MTBF</b>	1.5M hours	1.5 M hours	1.2 M hours
<b>Hardware Encryption</b>			
	<b>240GB SATA SSD, 6Gb/s, OPAL. 2.5"</b>	<b>2 TB SATA SSD, 6Gb/s, 2.5" OPAL</b>	<b>256GB SATA SSD, 6Gb/s, 2.5" OPAL</b>
<b>Supported Types</b>			

<b>Dimensions inches/centimeters (W x D x H)</b>			
<b>Size</b>			
<b>Interface Type</b>			
<b>Read/Write IOPS Specifications</b>			
<b>Bandwidth Performance</b>			
<b>Power Consumption (Max)</b>			
<b>Active(AVG)</b>			
<b>Idle</b>			
<b>Min MTBF</b>	1.2 M hours	1.5M hours	1.5 M hours
<b>Min Sequential Read</b>	540 MB/s	530 MB/s	520 MB/s
<b>Min Sequential Write</b>	490 MB/s	500 MB/s	450 MB/s
<b>Min Random Read (8GB Span)</b>	41000 IOPS	920000 IOPS	92000 IOPS
<b>Min Random Write (8GB Span)</b>	49000 IOPS	83000 IOPS	38000 IOPS
<b>Min Power - Active</b>	165 mW	150 mW	155 mW
<b>Min Power - Idle</b>	55 mW	110 mW	75 mW
<b>Min MTBF</b>	1.2 M hours	1.5M hours	1.5 M hours
<b>Hardware Encryption</b>			

	<b>256GB SATA SSD, 6Gb/s, 2.5" Non-OPAL</b>	<b>400GB PCIe - Intel 750 2.5"</b>	<b>480GB SATA SSD, 6Gb/s,OPAL. 2.5"</b>
<b>Supported Types</b>			
<b>Dimensions inches/centimeters (W x D x H)</b>			
<b>Size</b>			
<b>Interface Type</b>			
<b>Read/Write IOPS Specifications</b>			
<b>Bandwidth Performance</b>			
<b>Power Consumption (Max)</b>			
<b>Active(AVG)</b>			
<b>Idle</b>			
<b>Min MTBF</b>	1.5 M hours		1.2 M hours
<b>Min Sequential Read</b>	520 MB/s		540 MB/s
<b>Min Sequential Write</b>	450 MB/s		490 MB/s
<b>Min Random Read (8GB Span)</b>	92000 IOPS		48000 IOPS
<b>Min Random Write (8GB Span)</b>	38000 IOPS		37000 IOPS
<b>Min Power - Active</b>	155 mW		165 mW
<b>Min Power - Idle</b>	75 mW		55 mW
<b>Min MTBF</b>	1.5 M hours		1.2 M hours
<b>Hardware Encryption</b>			

	<b>400GB PCIe - Intel P3700</b>
<b>Supported Types</b>	
<b>Dimensions inches/centimeters (W x D x H)</b>	



Size	
Interface Type	
Read/Write IOPS Specifications	
Bandwidth Performance	
Power Consumption (Max)	
Active(AVG)	
Idle	
Min MTBF	
Min Sequential Read	
Min Sequential Write	
Min Random Read (8GB Span)	
Min Random Write (8GB Span)	
Min Power - Active	
Min Power - Idle	
Min MTBF	
Hardware Encryption	

**PCIe Add-on Storage Devices**

	<b>1 TB SATA SSD, 6Gb/s, 2.5" Non-OPAL</b>	<b>128GB SATA SSD, 6Gb/s, 2.5" Non-OPAL</b>	<b>180GB SATA SSD, 6Gb/s, OPAL.2.5"</b>
Interface			
Capacity			
Power Consumption			
Sequential Read			
Sequential Write			
Random Read (100% Span)			
Random Write (100% Span)			
Latency - Read			
Latency - Write			
Power - Active			
Power - Idle			
Operating Temperature Range			
Endurance Rating (Lifetime Writes)			
Mean Time Between Failures (MTBF)			

	<b>240GB SATA SSD, 6Gb/s, OPAL. 2.5"</b>	<b>2 TB SATA SSD, 6Gb/s, 2.5" OPAL</b>	<b>256GB SATA SSD, 6Gb/s, 2.5" OPAL</b>
Interface			
Capacity			
Power Consumption			
Sequential Read			
Sequential Write			

Random Read (100% Span)			
Random Write (100% Span)			
Latency - Read			
Latency - Write			
Power - Active			
Power - Idle			
Operating Temperature Range			
Endurance Rating (Lifetime Writes)			
Mean Time Between Failures (MTBF)			
	<b>256GB SATA SSD, 6Gb/s, 2.5"</b> <b>Non-OPAL</b>	<b>400GB PCIe - Intel 750 2.5"</b>	<b>480GB SATA SSD, 6Gb/s,OPAL. 2.5"</b>
Interface		PCIe Gen 3x4	
Capacity			
Power Consumption			
Sequential Read		2300 MB/s	
Sequential Write		1000 MB/s	
Random Read (100% Span)			
Random Write (100% Span)			
Latency - Read			
Latency - Write		20 $\mu$ s	
Power - Active		12	
Power - Idle		4	
Operating Temperature Range		0°C to 35°C	
Endurance Rating (Lifetime Writes)		70GB per day	
Mean Time Between Failures (MTBF)		1.2M hours	
	<b>400GB PCIe - Intel P3700</b>		
Interface	PCIe Gen 3x4		
Capacity			
Power Consumption			
Sequential Read	2700 MB/s		
Sequential Write	1080 MB/s		
Random Read (100% Span)			
Random Write (100% Span)			
Latency - Read			
Latency - Write	20 $\mu$ s		
Power - Active	12W (write), 9W (read)		
Power - Idle	4w		
Operating Temperature Range	0°C to 55°C		
Endurance Rating (Lifetime Writes)	10 DWPD		

<b>Mean Time Between Failures (MTBF)</b>	2,000,000 Hrs
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#### HDD Controllers

	<b>LSI 9364-8i 8-port SATA/SAS ROC Adapter(Base Mode) w/ 1GB DDR Memory Module</b>	<b>LSI SAS/SATA RAID Flex adapter</b>
<b>PCI Bus</b>	x8 lane PCI Express® 3.0	x8 lane PCI Express® 3.0
<b>PCI Modes</b>		
<b>RAID Levels</b>	RAID 0, 1, 5, 10, 50 and JBOD mod	RAID 0, 1, 5, 10, 50 and JBOD mod
<b>Data Transfer Rates</b>	Up to 12Gb/s per port	Up to 12Gb/s per port
<b>PCI Card Type</b>		
<b>PCI Voltage</b>	+3.3V, +12V	+3.3V, +12V
<b>PCI Power</b>		
<b>Bracket</b>	Full Height and Low-Profile	Full Height and Low-Profile
<b>Certification Level</b>		
<b>Internal Connectors</b>	2 HD Mini-SAS SFF8643 (Vertical mount)	2 HD Mini-SAS SFF8643 (Vertical mount)

#### Optical Drive Specifications

	<b>DVD-ROM Drive - 16x/48x (SATA)</b>	<b>DVD Burner/CD-RW Rambo Drive (SATA)</b>
<b>Description</b>	5.25-inch, half-height, tray-load	5.25-inch, half-height, tray-load
<b>Mounting Orientation</b>	Either horizontal or vertical	Either horizontal or vertical
<b>Interface Type</b>	SATA/ATAPI	SATA/ATAPI
<b>Dimensions</b>	(WxHxD) 15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)	(WxHxD) 15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)
<b>Disc Capacity DVD-ROM</b>	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB
<b>Type</b>		
<b>External Dimensions INCHES/CENTIMETERS (Of Actual Drive Without Bezel-W x H x D)</b>		
<b>Speed</b>		
<b>Bay Type</b>		
<b>Color</b>		
<b>Removable</b>		
<b>Interface Type and Speed</b>		
<b>Weight (max) POUNDS/KILOGRAMS</b>		
<b>Internal Buffer Size</b>		

#### Rates

	<b>DVD-ROM Drive - 16x/48x (SATA)</b>	<b>DVD Burner/CD-RW Rambo Drive (SATA)</b>
<b>Writes</b>		

<b>Reads</b>		
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#### Access Times

	<b>DVD-ROM Drive - 16x/48x (SATA)</b>	<b>DVD Burner/CD-RW Rambo Drive (SATA)</b>
<b>Access Times (typical)</b>		
<b>DVD-ROM Single Layer</b>	< 140 ms (typical)	< 140 ms (typical)
<b>CD-ROM Mode 1</b>	< 125 ms (typical)	< 125 ms (typical)
<b>Full Stroke DVD</b>	< 250 ms (seek)	< 250 ms (seek)
<b>Full Stroke CD</b>	< 210 ms (seek)	< 210 ms (seek)

#### Power

	<b>DVD-ROM Drive - 16x/48x (SATA)</b>	<b>DVD Burner/CD-RW Rambo Drive (SATA)</b>
<b>Source</b>		
<b>DC Power Requirements</b>	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 10%-200 mV ripple p-p	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 10%-200 mV ripple p-p
<b>DC Current</b>	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 1000 mA typical, < 2000 mA maximum	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 1000 mA typical, < 2000 mA maximum

#### Operating Systems Supported

	<b>DVD-ROM Drive - 16x/48x (SATA)</b>	<b>DVD Burner/CD-RW Rambo Drive (SATA)</b>
<b>Operating Systems Supported</b>		

#### Operating Environment

	<b>DVD-ROM Drive - 16x/48x (SATA)</b>	<b>DVD Burner/CD-RW Rambo Drive (SATA)</b>
<b>Temperature</b>	5° to 50° C (41° to 122° F)	5° to 50° C (41° to 122° F)
<b>Relative Humidity</b>	8% to 80%	8% to 80%
<b>Maximum Wet Bulb Temperature</b>	30° C (86° F)	30° C (86° F)

#### Graphics Cards

	<b>NVIDIA P4000</b>	<b>NVIDIA P5000</b>	<b>NVIDIA P400</b>
<b># CUDA Cores</b>			
<b>Single Precision</b>			
<b>PCIe Gen</b>			
<b>Memory Size</b>			
<b>Memory BW</b>			
<b>Slots + Display Connectors</b>			
<b>Display Support</b>			
<b>Advanced Display</b>			
<b>Board Power</b>			

<b>Max Power</b>			
<b>Max Resolution</b>			
<b>SLI Support</b>			
<b>Form Factor</b>			

	<b>NVIDIA P600</b>	<b>NVS310</b>	<b>NVS315</b>
<b># CUDA Cores</b>		48	48
<b>Single Precision</b>			
<b>PCIe Gen</b>		2	2
<b>Memory Size</b>		512 MB	1 GB
<b>Memory BW</b>		14 GB/s	14 GB/s
<b>Slots + Display Connectors</b>		DP	DMS-59
<b>Display Support</b>		2	2
<b>Advanced Display</b>			
<b>Board Power</b>			
<b>Max Power</b>		19.5 W	19.3 W
<b>Max Resolution</b>		2560 x 1600 at 60Hz (DP)	2560 x 1600 at 60Hz (DP)
<b>SLI Support</b>			
<b>Form Factor</b>		HH	HH

	<b>NVS510</b>	<b>NVIDIA P6000</b>	<b>P5000</b>
<b># CUDA Cores</b>	192		2560
<b>Single Precision</b>			
<b>PCIe Gen</b>	2		3
<b>Memory Size</b>	2 GB		16G
<b>Memory BW</b>	28.5 GB/s		288 GB/s
<b>Slots + Display Connectors</b>	Mini DP		4xDP+DVI-D
<b>Display Support</b>	4		5
<b>Advanced Display</b>			SDI, SYNC, Stereo
<b>Board Power</b>			180W
<b>Max Power</b>	35 W		
<b>Max Resolution</b>	3840x2160 at 60Hz (DP)		
<b>SLI Support</b>			Yes
<b>Form Factor</b>	HH		FH

	<b>NVS810</b>
<b># CUDA Cores</b>	1024(512 per GPU)
<b>Single Precision</b>	
<b>PCIe Gen</b>	3
<b>Memory Size</b>	4 GB
<b>Memory BW</b>	28.8 GB/s
<b>Slots + Display Connectors</b>	Mini DP
<b>Display Support</b>	8
<b>Advanced Display</b>	

<b>Board Power</b>	
<b>Max Power</b>	68 W
<b>Max Resolution</b>	4096x2160 at 30Hz (DP)
<b>SLI Support</b>	
<b>Form Factor</b>	FH

#### Integrated Graphics Adapter

	<b>NVIDIA P4000</b>	<b>NVIDIA P5000</b>	<b>NVIDIA P400</b>
<b>Type</b>			
<b>TGP (GPU + VRAM)</b>			
<b>Bus Interface</b>			
<b>Display Interface</b>			
<b>Video Resolution (max)</b>			
<b>Graphics Cover Name</b>			
<b>Video Ram Max</b>			
<b>Memory type</b>			
<b>Memory bit</b>			
<b>Memory Bandwidth</b>			
<b>VRAM Type</b>			
<b>GPU Cuda Cores</b>			
<b>DisplayPort Max Resolution &amp; Color Depth</b>			
<b>HDMI Max Resolution &amp; Color Depth</b>			
<b>DirectX</b>			
<b>OpenGL</b>			
<b>OpenCL</b>			
<b>Optimus</b>			
<b>OS Support</b>			
<b>Triple Monitor Support</b>			
<b>Display Rotation Support</b>			
<b>3D Setup &amp; Render Engine</b>			
<b>GPU Core Clock</b>			
<b>Maximum Color Depth</b>			
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>			
<b>Type</b>	Discrete	Discrete	Discrete
<b>Bus Interface</b>	PCI-E 3.0, 16x	PCI-E 3.0, 16x	PCI-E 3.0, 16x
<b>Display Interface</b>	4 xDP	4 xDP+DVI-D	3 xMini DP
<b>Graphics Chipset</b>	GP104-850-A1	GP104-875-A1	GP107-825
<b>Memory clock frequency(MHz)</b>	3802 MHz	4513 MHz	2000MHz
<b>Memory size</b>	8GB	16GB	2GB

<b>Memory bit(bit)</b>	256 bit	256 bit	64 bit
<b>Memory BW</b>	Up to 243 GBps	Up to 288 GBps	Up to 32 GBps
<b>Dual Monitor Support</b>	Yes	Yes	Yes
<b>Display Rotation Support</b>	Yes	Yes	Yes
<b>3D Setup &amp; Render Engine</b>	DX12	DX12	DX12
<b>VRAM Type</b>	DDR5	GDDR5	DDR5
<b>GPU Cuda Cores</b>	1792	2560	256
<b>GPU Core frequency(MHz)</b>	1480 MHz	1607 MHz	1252 MHz
<b>Maximum Power Consumption</b>	105 W	180 W	40 W
<b>Operating System Graphics/Video API Support</b>	Window 7 64bit, Windows 10 64bit, Linux 64bit	Window 7 64bit, Windows 10 64bit, Linux 64bit	Window 7 64bit, Windows 10 64bit, Linux 64bit
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>	Maximum pixel clock: 592 MPixels per second Maximum bandwidth: 17.2 Gbps Maximum supported resolution (eight simultaneous displays): 4096 x 2160 at 30 Hz	Maximum pixel clock: 1050 MPixels per second Maximum bandwidth: 32.4 Gbps Example of maximum resolutions with CVT-RB timings: • 7680 x 4320 x 24 bpp at 120 Hz2 • 7680 x 4320 x 24 bpp at 60 Hz3 • 5120 x 2880 x 24 bpp at 60 Hz	Maximum pixel clock: 592 MPixels per second Maximum bandwidth: 17.2 Gbps Maximum supported resolution (eight simultaneous displays): 4096 x 2160 at 30 Hz
<b>Thermal</b>	Active	Active	Active
<b>Dimension</b>	4.38 inches x 7.9 inches, Single-slot 260 Grams	4.376 inches x 10.5 inches, dual-slot	2.713 inches x 5.7 inches
<b>Advanced Display</b>	SDI, SYNC, Stereo	SDI, SYNC, Stereo	No
<b>SLI Support</b>	Yes	Yes	No

	<b>NVIDIA P600</b>	<b>NVS310</b>	<b>NVS315</b>
<b>Type</b>			
<b>TGP (GPU + VRAM)</b>			
<b>Bus Interface</b>			
<b>Display Interface</b>			
<b>Video Resolution (max)</b>			
<b>Graphics Cover Name</b>			
<b>Video Ram Max</b>			
<b>Memory type</b>			
<b>Memory bit</b>			
<b>Memory Bandwidth</b>			
<b>VRAM Type</b>			
<b>GPU Cuda Cores</b>			
<b>DisplayPort Max Resolution &amp; Color Depth</b>			
<b>HDMI Max Resolution &amp; Color Depth</b>			
<b>DirectX</b>			
<b>OpenGL</b>			
<b>OpenCL</b>			

<b>Optimus</b>			
<b>OS Support</b>			
<b>Triple Monitor Support</b>			
<b>Display Rotation Support</b>			
<b>3D Setup &amp; Render Engine</b>			
<b>GPU Core Clock</b>			
<b>Maximum Color Depth</b>			
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>			
<b>Type</b>	Discrete		
<b>Bus Interface</b>	PCI-E 3.0, 16x		
<b>Display Interface</b>	4 xMini DP		
<b>Graphics Chipset</b>	GP107-850		
<b>Memory clock frequency(MHz)</b>	2000MHz		
<b>Memory size</b>	2GB		
<b>Memory bit(bit)</b>	128 bit		
<b>Memory BW</b>	Up to 64 GBps		
<b>Dual Monitor Support</b>	Yes		
<b>Display Rotation Support</b>	Yes		
<b>3D Setup &amp; Render Engine</b>	DX12		
<b>VRAM Type</b>	DDR5		
<b>GPU Cuda Cores</b>	384		
<b>GPU Core frequency(MHz)</b>	1556 MHz		
<b>Maximum Power Consumption</b>	40 W		
<b>Operating System Graphics/Video API Support</b>	Window 7 64bit, Windows 10 64bit, Linux 64bit		
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>	Maximum pixel clock: 592 MPixels per second Maximum bandwidth: 17.2 Gbps Maximum supported resolution (eight simultaneous displays): 4096 x 2160 at 30 Hz		
<b>Thermal</b>	Active		
<b>Dimension</b>	2.713 inches x 5.7 inches		
<b>Advanced Display</b>	No		
<b>SLI Support</b>	No		

	<b>NVS510</b>	<b>NVIDIA P6000</b>	<b>P5000</b>
<b>Type</b>			
<b>TGP (GPU + VRAM)</b>			
<b>Bus Interface</b>			
<b>Display Interface</b>			
<b>Video Resolution (max)</b>			
<b>Graphics Cover Name</b>			



<b>Video Ram Max</b>			
<b>Memory type</b>			
<b>Memory bit</b>			
<b>Memory Bandwidth</b>			
<b>VRAM Type</b>			
<b>GPU Cuda Cores</b>			
<b>DisplayPort Max Resolution &amp; Color Depth</b>			
<b>HDMI Max Resolution &amp; Color Depth</b>			
<b>DirectX</b>			
<b>OpenGL</b>			
<b>OpenCL</b>			
<b>Optimus</b>			
<b>OS Support</b>			
<b>Triple Monitor Support</b>			
<b>Display Rotation Support</b>			
<b>3D Setup &amp; Render Engine</b>			
<b>GPU Core Clock</b>			
<b>Maximum Color Depth</b>			
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>			
<b>Type</b>		Discrete	
<b>Bus Interface</b>		PCI-E 3.0, 16x	
<b>Display Interface</b>		4 xDP+DVI-D	
<b>Graphics Chipset</b>		GP102-875-A1	
<b>Memory clock frequency(MHz)</b>		4513 MHz	
<b>Memory size</b>		24GB	
<b>Memory bit(bit)</b>		384 bit	
<b>Memory BW</b>		Up to 432 GBps	
<b>Dual Monitor Support</b>		Yes	
<b>Display Rotation Support</b>		Yes	
<b>3D Setup &amp; Render Engine</b>		DX12	
<b>VRAM Type</b>		GDDR5	
<b>GPU Cuda Cores</b>		3840	
<b>GPU Core frequency(MHz)</b>		1506 MHz	
<b>Maximum Power Consumption</b>		250 W	
<b>Operating System Graphics/Video API Support</b>		Window 7 64bit, Windows 10 64bit, Linux 64bit	
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>		Maximum pixel clock: 1050 MPixels per second Maximum bandwidth: 32.4 Gbps Example of maximum resolutions with CVT-RB	

		timings: • 7680 x 4320 x 24 bpp at 120 Hz2 • 7680 x 4320 x 24 bpp at 60 Hz3 • 5120 x 2880 x 24 bpp at 60 Hz	
<b>Thermal</b>		Active	
<b>Dimension</b>		4.376 inches x 10.5 inches, dual-slot	
<b>Advanced Display</b>		SDI, SYNC, Stereo	
<b>SLI Support</b>		Yes	

	<b>NVS810</b>
<b>Type</b>	
<b>TGP (GPU + VRAM)</b>	
<b>Bus Interface</b>	
<b>Display Interface</b>	
<b>Video Resolution (max)</b>	
<b>Graphics Cover Name</b>	
<b>Video Ram Max</b>	
<b>Memory type</b>	
<b>Memory bit</b>	
<b>Memory Bandwidth</b>	
<b>VRAM Type</b>	
<b>GPU Cuda Cores</b>	
<b>DisplayPort Max Resolution &amp; Color Depth</b>	
<b>HDMI Max Resolution &amp; Color Depth</b>	
<b>DirectX</b>	
<b>OpenGL</b>	
<b>OpenCL</b>	
<b>Optimus</b>	
<b>OS Support</b>	
<b>Trible Monitor Support</b>	
<b>Display Rotation Support</b>	
<b>3D Setup &amp; Render Engine</b>	
<b>GPU Core Clock</b>	
<b>Maximum Color Depth</b>	
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>	
<b>Type</b>	
<b>Bus Interface</b>	
<b>Display Interface</b>	
<b>Graphics Chipset</b>	

Memory clock frequency(MHz)	
Memory size	
Memory bit(bit)	
Memory BW	
Dual Monitor Support	
Display Rotation Support	
3D Setup & Render Engine	
VRAM Type	
GPU Cuda Cores	
GPU Core frequency(MHz)	
Maximum Power Consumption	
Operating System Graphics/Video API Support	
Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)	
Thermal	
Dimension	
Advanced Display	
SLI Support	

**Discrete Graphics Adapter**

	NVIDIA P4000	NVIDIA P5000	NVIDIA P400
Type			
TGP (GPU + VRAM)			
Bus Interface			
Display Interface			
Video Resolution (max)			
Graphics Cover Name			
Video Ram Max			
Memory type			
Memory bit			
Memory Bandwidth			
VRAM Type			
GPU Cuda Cores			
DisplayPort Max Resolution & Color Depth			
HDMI Max Resolution & Color Depth			
DirectX			
OpenGL			
OpenCL			
Optimus			
OS Support			

<b>Tribble Monitor Support</b>			
<b>Display Rotation Support</b>			
<b>3D Setup &amp; Render Engine</b>			
<b>GPU Core Clock</b>			
<b>Maximum Color Depth</b>			
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>			
<b>Type</b>	Discrete	Discrete	Discrete
<b>Bus Interface</b>	PCI-E 3.0, 16x	PCI-E 3.0, 16x	PCI-E 3.0, 16x
<b>Display Interface</b>	4 xDP	4 xDP+DVI-D	3 xMini DP
<b>Graphics Chipset</b>	GP104-850-A1	GP104-875-A1	GP107-825
<b>Memory clock frequency(MHz)</b>	3802 MHz	4513 MHz	2000MHz
<b>Memory size</b>	8GB	16GB	2GB
<b>Memory bit(bit)</b>	256 bit	256 bit	64 bit
<b>Memory BW</b>	Up to 243 GBps	Up to 288 GBps	Up to 32 GBps
<b>Dual Monitor Support</b>	Yes	Yes	Yes
<b>Display Rotation Support</b>	Yes	Yes	Yes
<b>3D Setup &amp; Render Engine</b>	DX12	DX12	DX12
<b>VRAM Type</b>	DDR5	GDDR5	DDR5
<b>GPU Cuda Cores</b>	1792	2560	256
<b>GPU Core frequency(MHz)</b>	1480 MHz	1607 MHz	1252 MHz
<b>Maximum Power Consumption</b>	105 W	180 W	40 W
<b>Operating System Graphics/Video API Support</b>	Window 7 64bit, Windows 10 64bit, Linux 64bit	Window 7 64bit, Windows 10 64bit, Linux 64bit	Window 7 64bit, Windows 10 64bit, Linux 64bit
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>	Maximum pixel clock: 592 MPixels per second Maximum bandwidth: 17.2 Gbps Maximum supported resolution (eight simultaneous displays): 4096 x 2160 at 30 Hz	Maximum pixel clock: 1050 MPixels per second Maximum bandwidth: 32.4 Gbps Example of maximum resolutions with CVT-RB timings: • 7680 x 4320 x 24 bpp at 120 Hz2 • 7680 x 4320 x 24 bpp at 60 Hz3 • 5120 x 2880 x 24 bpp at 60 Hz	Maximum pixel clock: 592 MPixels per second Maximum bandwidth: 17.2 Gbps Maximum supported resolution (eight simultaneous displays): 4096 x 2160 at 30 Hz
<b>Thermal</b>	Active	Active	Active
<b>Dimension</b>	4.38 inches x 7.9 inches, Single-slot 260 Grams	4.376 inches x 10.5 inches, dual-slot	2.713 inches x 5.7 inches
<b>Advanced Display</b>	SDI, SYNC, Stereo	SDI, SYNC, Stereo	No
<b>SLI Support</b>	Yes	Yes	No
	<b>NVIDIA P600</b>	<b>NVS310</b>	<b>NVS315</b>
<b>Type</b>			
<b>TGP (GPU + VRAM)</b>			
<b>Bus Interface</b>			
<b>Display Interface</b>			
<b>Video Resolution (max)</b>			

<b>Graphics Cover Name</b>			
<b>Video Ram Max</b>			
<b>Memory type</b>			
<b>Memory bit</b>			
<b>Memory Bandwidth</b>			
<b>VRAM Type</b>			
<b>GPU Cuda Cores</b>			
<b>DisplayPort Max Resolution &amp; Color Depth</b>			
<b>HDMI Max Resolution &amp; Color Depth</b>			
<b>DirectX</b>			
<b>OpenGL</b>			
<b>OpenCL</b>			
<b>Optimus</b>			
<b>OS Support</b>			
<b>Triple Monitor Support</b>			
<b>Display Rotation Support</b>			
<b>3D Setup &amp; Render Engine</b>			
<b>GPU Core Clock</b>			
<b>Maximum Color Depth</b>			
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>			
<b>Type</b>	Discrete		
<b>Bus Interface</b>	PCI-E 3.0, 16x		
<b>Display Interface</b>	4 xMini DP		
<b>Graphics Chipset</b>	GP107-850		
<b>Memory clock frequency(MHz)</b>	2000MHz		
<b>Memory size</b>	2GB		
<b>Memory bit(bit)</b>	128 bit		
<b>Memory BW</b>	Up to 64 GBps		
<b>Dual Monitor Support</b>	Yes		
<b>Display Rotation Support</b>	Yes		
<b>3D Setup &amp; Render Engine</b>	DX12		
<b>VRAM Type</b>	DDR5		
<b>GPU Cuda Cores</b>	384		
<b>GPU Core frequency(MHz)</b>	1556 MHz		
<b>Maximum Power Consumption</b>	40 W		
<b>Operating System Graphics/Video API Support</b>	Window 7 64bit, Windows 10 64bit, Linux 64bit		
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>	Maximum pixel clock: 592 MPixels per second Maximum bandwidth: 17.2 Gbps Maximum supported resolution		

	(eight simultaneous displays): 4096 x 2160 at 30 Hz		
<b>Thermal</b>	Active		
<b>Dimension</b>	2.713 inches x 5.7 inches		
<b>Advanced Display</b>	No		
<b>SLI Support</b>	No		

	<b>NVS510</b>	<b>NVIDIA P6000</b>	<b>P5000</b>
<b>Type</b>			
<b>TGP (GPU + VRAM)</b>			
<b>Bus Interface</b>			
<b>Display Interface</b>			
<b>Video Resolution (max)</b>			
<b>Graphics Cover Name</b>			
<b>Video Ram Max</b>			
<b>Memory type</b>			
<b>Memory bit</b>			
<b>Memory Bandwidth</b>			
<b>VRAM Type</b>			
<b>GPU Cuda Cores</b>			
<b>DisplayPort Max Resolution &amp; Color Depth</b>			
<b>HDMI Max Resolution &amp; Color Depth</b>			
<b>DirectX</b>			
<b>OpenGL</b>			
<b>OpenCL</b>			
<b>Optimus</b>			
<b>OS Support</b>			
<b>Triple Monitor Support</b>			
<b>Display Rotation Support</b>			
<b>3D Setup &amp; Render Engine</b>			
<b>GPU Core Clock</b>			
<b>Maximum Color Depth</b>			
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>			
<b>Type</b>		Discrete	
<b>Bus Interface</b>		PCI-E 3.0, 16x	
<b>Display Interface</b>		4 xDP+DVI-D	
<b>Graphics Chipset</b>		GP102-875-A1	
<b>Memory clock frequency(MHz)</b>		4513 MHz	
<b>Memory size</b>		24GB	
<b>Memory bit(bit)</b>		384 bit	

<b>Memory BW</b>		Up to 432 GBps	
<b>Dual Monitor Support</b>		Yes	
<b>Display Rotation Support</b>		Yes	
<b>3D Setup &amp; Render Engine</b>		DX12	
<b>VRAM Type</b>		GDDR5	
<b>GPU Cuda Cores</b>		3840	
<b>GPU Core frequency(MHz)</b>		1506 MHz	
<b>Maximum Power Consumption</b>		250 W	
<b>Operating System Graphics/Video API Support</b>		Window 7 64bit, Windows 10 64bit, Linux 64bit	
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>		<p>Maximum pixel clock: 1050 MPixels per second  Maximum bandwidth: 32.4 Gbps  Example of maximum resolutions with CVT-RB timings:</p> <ul style="list-style-type: none"> <li>• 7680 x 4320 x 24 bpp at 120 Hz2</li> <li>• 7680 x 4320 x 24 bpp at 60 Hz3</li> <li>• 5120 x 2880 x 24 bpp at 60 Hz</li> </ul>	
<b>Thermal</b>		Active	
<b>Dimension</b>		4.376 inches x 10.5 inches, dual-slot	
<b>Advanced Display</b>		SDI, SYNC, Stereo	
<b>SLI Support</b>		Yes	

	<b>NVS810</b>
<b>Type</b>	
<b>TGP (GPU + VRAM)</b>	
<b>Bus Interface</b>	
<b>Display Interface</b>	
<b>Video Resolution (max)</b>	
<b>Graphics Cover Name</b>	
<b>Video Ram Max</b>	
<b>Memory type</b>	
<b>Memory bit</b>	
<b>Memory Bandwidth</b>	
<b>VRAM Type</b>	
<b>GPU Cuda Cores</b>	
<b>DisplayPort Max Resolution &amp; Color Depth</b>	
<b>HDMI Max Resolution &amp; Color Depth</b>	
<b>DirectX</b>	
<b>OpenGL</b>	
<b>OpenCL</b>	
<b>Optimus</b>	

<b>OS Support</b>	
<b>Triple Monitor Support</b>	
<b>Display Rotation Support</b>	
<b>3D Setup &amp; Render Engine</b>	
<b>GPU Core Clock</b>	
<b>Maximum Color Depth</b>	
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>	
<b>Type</b>	
<b>Bus Interface</b>	
<b>Display Interface</b>	
<b>Graphics Chipset</b>	
<b>Memory clock frequency(MHz)</b>	
<b>Memory size</b>	
<b>Memory bit(bit)</b>	
<b>Memory BW</b>	
<b>Dual Monitor Support</b>	
<b>Display Rotation Support</b>	
<b>3D Setup &amp; Render Engine</b>	
<b>VRAM Type</b>	
<b>GPU Cuda Cores</b>	
<b>GPU Core frequency(MHz)</b>	
<b>Maximum Power Consumption</b>	
<b>Operating System Graphics/Video API Support</b>	
<b>Supported Resolutions and Max Refresh Rates(Hz) (Note: analog and/or digital)</b>	
<b>Thermal</b>	
<b>Dimension</b>	
<b>Advanced Display</b>	
<b>SLI Support</b>	

Networking

	<b>Intel i218 Gigabit Ethernet - LM</b>	<b>Intel i210 Gigabit Ethernet - AT</b>
<b>Connector</b>		
<b>Controller</b>		

Intel® Ethernet Connections

	<b>Intel i218 Gigabit Ethernet - LM</b>	<b>Intel i210 Gigabit Ethernet - AT</b>
<b>Data Rates Supported</b>		
<b>Controller Details</b>		



<b>Controller bus architecture</b>		
<b>Integrated memory</b>		
<b>Data transfer mode</b>		
<b>Power consumption</b>		
<b>IEEE Standards Compliance</b>		
<b>Boot ROM Support</b>		
<b>Network Transfer Mode (Full/Half Duplex)</b>		
<b>Network Transfer Rate</b>		
<b>Operating System Driver Support</b>		
<b>Manageability</b>		
<b>Manageability Capabilities Alerting</b>		
<b>Lithography</b>	40 nm	
<b>TDP</b>	0.5 W	
<b>Operating Temperature Range</b>	0°C to 85°C	0°C to 70°C
<b># of Ports</b>	Single	Single
<b>Data Rate Per Port</b>	1 Gbps	1 Gbps
<b>System Interface Type</b>		PCIe v2.1 (2.5GT/s)
<b>NC Sideband Interface</b>		Yes
<b>Jumbo Frames Supported</b>	Yes	Yes
<b>1000Base-T</b>	Yes	Yes
<b>MACsec IEEE 802.1 AE</b>		No
<b>IEEE 1588</b>		Yes
<b>Supported Under vPro</b>	Yes	

#### Ethernet

	<b>Intel i218 Gigabit Ethernet - LM</b>	<b>Intel i210 Gigabit Ethernet - AT</b>
<b>Connector</b>		
<b>Model</b>		
<b>Website</b>		
<b>10BASE-T (IEEE 802.3 specification conformance)</b>		
<b>100BASE-TX (IEEE 802.3 specification conformance)</b>		
<b>1000BASE-T (IEEE 802.3 specification conformance)</b>		
<b>Auto-Negotiation (IEEE 802.3u)</b>		
<b>Intel® vPro™ 2 technology</b>		
<b>Intel® Stable Image Platform Program (SIPP)</b>		
<b>Intel® Standard Manageability</b>		
<b>Power optimizer platform low-power management systems</b>		

Energy Efficient Ethernet1 (IEEE 802.3az)		
TCP/UDP checksum and segmentation offload (IPv4 and IPv6)		
Receive Side Scaling		
Dual Tx and Rx queues		
Jumbo Frames (up to 9 KB)		
Teaming		
Integrated Auto Connect Battery Saver (ACBS) battery savings		
Timing and Synchronization (802.1as / 1588)		
Integrated Switched Voltage Regulator (ISVR)		
Shared Flash with system BIOS		
Wake from Deep Sx		
Server operating system support		
Network proxy/ARP support		
32 wake filter support		

**WLAN**

	Intel i218 Gigabit Ethernet - LM	Intel i210 Gigabit Ethernet - AT
Model		
Dimensions		
Weight		
Antenna Diversity		
Radio ON/OFF Control		
Connector interface		
Operating Temperature (Adapter Shield)		
Humidity Non-Operating		
Operating Systems		
Wi-Fi Alliance		
IEEE WLAN Standard		
Roaming		
Bluetooth*		
Authentication		
Authentication Protocols		
Encryption		
Regulatory		
US Government		
Product Safety		

**WWAN**

	<b>Intel i218 Gigabit Ethernet - LM</b>	<b>Intel i210 Gigabit Ethernet - AT</b>
<b>Model</b>		

4G LTE

	<b>Intel i218 Gigabit Ethernet - LM</b>	<b>Intel i210 Gigabit Ethernet - AT</b>
<b>Category</b>		
<b>Frequency Bands</b>		

3G

	<b>Intel i218 Gigabit Ethernet - LM</b>	<b>Intel i210 Gigabit Ethernet - AT</b>
<b>Frequency Bands</b>		

Data Speed

	<b>Intel i218 Gigabit Ethernet - LM</b>	<b>Intel i210 Gigabit Ethernet - AT</b>
<b>Peak Download Rate</b>		
<b>Peak Upload Rate</b>		

Location Solution

	<b>Intel i218 Gigabit Ethernet - LM</b>	<b>Intel i210 Gigabit Ethernet - AT</b>
<b>Satellite Systems</b>		

Audio Codecs

	<b>Intel i218 Gigabit Ethernet - LM</b>	<b>Intel i210 Gigabit Ethernet - AT</b>
<b>PCM/125</b>		

USB Drivers

	<b>Intel i218 Gigabit Ethernet - LM</b>	<b>Intel i210 Gigabit Ethernet - AT</b>
<b>Windows 7, 8.1, 10</b>		
<b>Linus</b>		
<b>Android RIL</b>		

Interfaces

	<b>Intel i218 Gigabit Ethernet - LM</b>	<b>Intel i210 Gigabit Ethernet - AT</b>
<b>USB</b>		
<b>SIM Interface 1.8V/3V</b>		

Control Options

	<b>Intel i218 Gigabit Ethernet -</b>	<b>Intel i210 Gigabit Ethernet -</b>
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	LM	AT
<b>APIs, AT Commands</b>		

#### Hardware

	Intel i218 Gigabit Ethernet - LM	Intel i210 Gigabit Ethernet - AT
<b>Dimension</b>		

#### Antenna

	Intel i218 Gigabit Ethernet - LM	Intel i210 Gigabit Ethernet - AT
<b>Connector: Main, Aux/GNSS, GNSS</b>		
<b>Diversity</b>		
<b>MIMO</b>		
<b>GNSS Biao</b>		

#### Temperature Range

	Intel i218 Gigabit Ethernet - LM	Intel i210 Gigabit Ethernet - AT
<b>Industrial Grade</b>		

#### Approvals

	Intel i218 Gigabit Ethernet - LM	Intel i210 Gigabit Ethernet - AT
<b>Regulatory</b>		
<b>Carrier</b>		

#### Cloud Services

	Intel i218 Gigabit Ethernet - LM	Intel i210 Gigabit Ethernet - AT
<b>Free Unlimited FOTA Upgrades</b>		
<b>Device Management Option</b>		
<b>Application Enablement Option</b>		
<b>Connectivity Management Option</b>		

#### Other

##### Media Card Reader

	9 in 1	29 in 1
<b>Description</b>	The Media card reader device is standard in our Pseries products. The device connects to a 2x5 two channel USB header on the motherboard of the system. There is no USB controller card provided. Please see the Disc Formats section below for a list of flash memory	The Media card reader mounts into our FLEX module which fits into a standard 5.25" Optical bay

	card formats that are supported.	
<b>Mounting Orientation</b>	The Media Card Reader can not be changed and is hard wired into the system	The Media Card Reader can not be changed, it only fits into the FLEX Module one way
<b>Interface Type</b>	USB 2.0 (one channel dedicated to the separate USB port; one channel dedicated to the flash memory card slots)	USB 2.0 (one channel dedicated to the separate USB port; one channel dedicated to the flash memory card slots)
<b>Disc Formats</b>	SD SDHC SDXC Mini SD Mini SDHC Micro SD* Micro SDHC* Micro SDXC* RS-MMC MMC MMC Micro MMC Mobile MMC Plus M2 *Available with adapter	xD-H xD-M Micro SD Micro SDHC SD SDHC SDXC Mini SD Mini SDHC MultiMediaCard (MMC) Reduced Size MultiMediaCard (RS MMC) (MMC Plus) (MMC Mobile) CompactFlash Card Type I (CF Type 1) CF Type 2 MicroDrive (MD) Memory Stick (MS) Memory Stick Select MS Duo MS PRO MS PRO DuMS PRO-HG Duo MS XS Duo MS XC-HG Duo MS HG Micro* MS XC Micro* MS XC-HG Micro* MMC Micro Memory Stick Micro (M2)* *Available with adapter

#### PCIe Add-on Cards

IEEE 1394a (Firewire-400) PCI Express x1 Adapter (1 internal port, 1 external port)

	<b>IEEE 1394a (Firewire-400) PCI Express x1 Adapter (1 internal port, 1 external port)</b>
<b>Data Transfer Rate</b>	Supports up to 400 Mbps
<b>Devices Supported</b>	IEEE-1394 compliant devices
<b>Bus Type</b>	PCIe card full height PCIe slots
<b>Ports</b>	One IEEE-1394a bilingual 6-Pin Connector (Rear)
<b>System Requirements</b>	Genuine Windows 10® Professional 64-bit Genuine Windows 10DG to 7® Professional 64-bit Genuine Windows 10® 64-bit Not supported on Linux Pentium® III or high processor 128 MB-RAM 1-GB Hard Drive CD-ROM drive built in sound system available PCI slot
<b>Operating Temperature</b>	50° to 131° F (10° to 55° C)
<b>Storage Temperature</b>	-22° to 140° F (-30° to 60° C)
<b>Relative Humidity - Operating</b>	20% to 80%

<b>Compliances</b>	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
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**Intel® Ethernet Adapters**

	<b>Intel I210-T1 Single Port Gigabit Ethernet Adapter</b>	<b>Intel I350-T2 Dual Port Gigabit Ethernet Adapter</b>	<b>Intel I350-T4 Quad Port Gigabit Ethernet Adapter</b>
<b>Cable Medium</b>		Copper	Copper
<b>Cabling Type</b>		Cat 5 up to 100m	Cat 5 up to 100m
<b>Bracket Height</b>		Low Profile and Full Height	Low Profile and Full Height
<b>TDP</b>		4.4W	5W
<b># of Ports</b>		Dual	Quad
<b>System Interface Type</b>		PCIe v2.1 (5.0GT/s)	PCIe v2.1 (5.0GT/s)
<b>Intel® Virtualization Technology for Connectivity (VT-c)</b>		Yes	Yes
<b>Speed &amp; Slot Width</b>		5 GT/s, x4 Lane	5 GT/s, x4 Lane
<b>Controller</b>		Intel I350	Intel I350
<b>iWARP/RDMA</b>		No	No
<b>Intel® Ethernet Power Management</b>		Yes	Yes
<b>Intel® Data Direct I/O Technology</b>			
<b>Intelligent Offloads</b>		Yes	Yes
<b>Storage Over Ethernet</b>		iSCSI, NFS	iSCSI, NFS
<b>On-chip QoS and Traffic Management</b>		Yes	Yes
<b>Flexible Port Partitioning</b>		Yes	Yes
<b>Virtual Machine Device Queues (VMDq)</b>		Yes	Yes
<b>PCI-SIG® SR-IOV Capable</b>		Yes	Yes

**Acoustics**

Configuration Information

Machine Types

Acoustic Noise Emissions Declaration

**Color Calibrator**

Colorimetric Accuracy

**Camera**