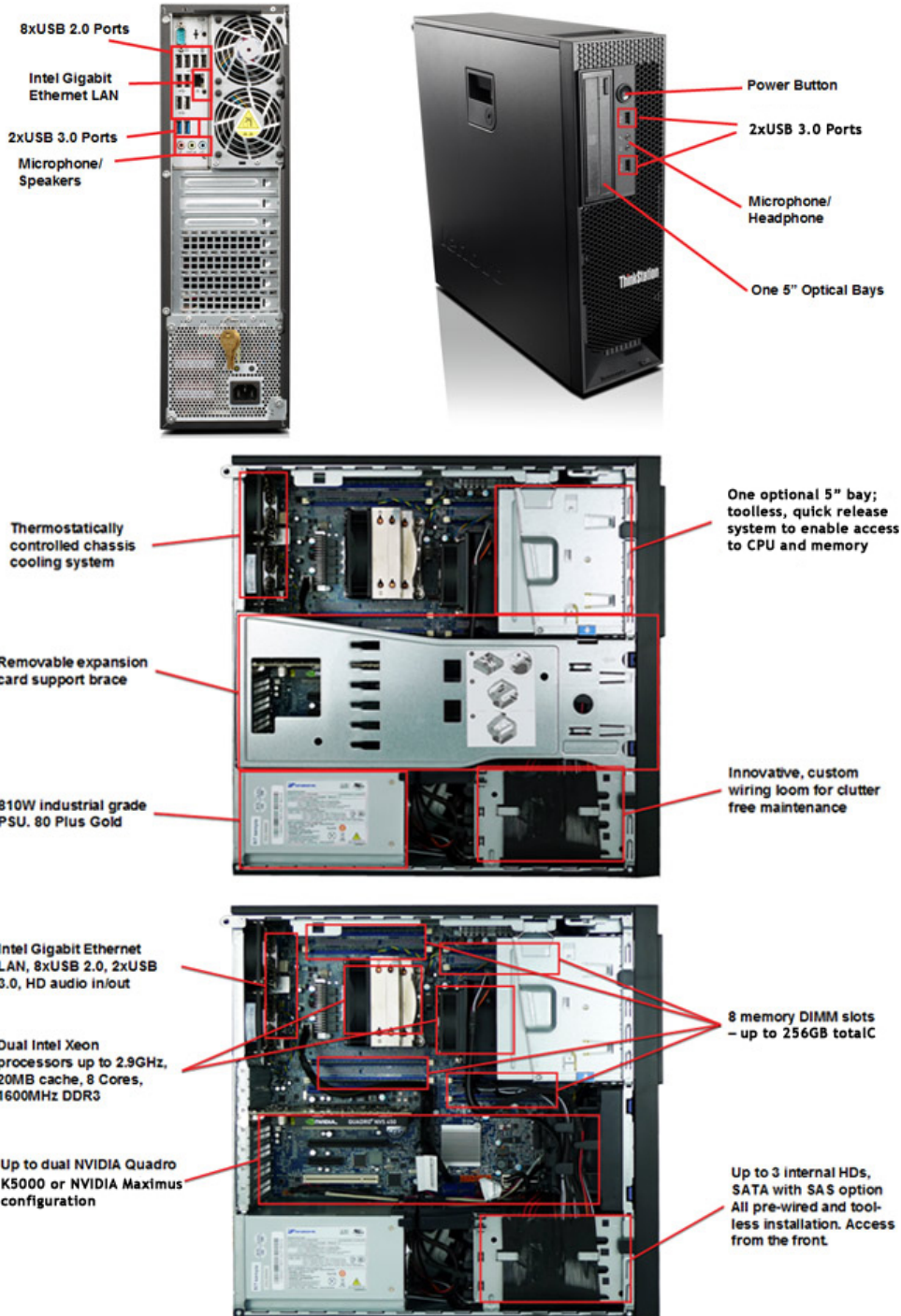




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THINKSTATION C30



Product Overview

The dual-processor C30 workstation uses an Extended-ATX/EEB based motherboard, an 800 Watt (W) power supply unit (PSU), and a 24-liter ATX form factor tower. The C30 motherboard consists of the Intel® C602 Chipset and two 2011-pin Land Grid Array (LGA2011) Socket-R processor sockets, with support for quad core, six core, eight core, ten core and twelve core processors from the Intel® Xeon line. Memory support consists of error-correcting code (ECC) unbuffered Double Data Rate 3 (DDR3) Synchronous Dynamic

Random Access Memory (SDRAM). Maximum memory supported is 128GB for UDIMMs and 256GB (pending 32GB RDIMM availability).

## SECTION I: SYSTEM OVERVIEW

### Operating Systems

#### Preloaded

Genuine Windows 8® Professional 64-bit  
 Genuine Windows 8.1® Professional 64-bit  
 Genuine Windows 7® Professional 64-bit  
 Genuine Windows 7® Professional 32-bit

#### Supported

Genuine Windows XP Professional 64-bit  
 Genuine Windows XP Professional 32-bit  
 Red Hat Enterprise Linux 6.4

### Motherboard - C30

Table 1. C30 Motherboard Summary

C30 Motherboard Summary	
<b>Form Factor</b>	
Board Size	12.23" x 14.01" (310.68mm x 355.9mm)
Layout	Custom, based on Extended-ATX/EEB Standard
<b>Motherboard Core</b>	
Processor Support	Intel® Xeon™ Dual Core (Sandy Bridge EP) Intel® Xeon™ Quad Core Intel® Xeon™ Six Core Intel® Xeon™ Eight Core Intel® Xeon™ Ten Core Intel® Xeon™ Twelve Core
Socket Type	(2) x Intel Socket-R (LGA2011)
Memory Support	1866/1600/1333/1066/800 MHz
QPI (GTPS)	6.4/7.2/8.0 GTPS Links
Voltage Regulator	VR12.1 - 130W TDP
Chipset (PCH)	Patsburg-A (Intel C602) Support for Intel HW module to allow enablement of Patsburg-B
Flash	128Mbit SPI Flash with FWH
HW Monitor	N/A
Super I/O	Nuvoton 6681D
Clock	ICS932SQ420B
Audio	Realtek ALC662-VD
Ethernet	Intel Lewisville(82579)
SAS	Integrated with Patsburg -A + Enablement Module (Patsburg -B equivalent)
<b>Memory</b>	
Slots	4 per CPU socket
Channels	4 per CPU socket
Type	DDR3 Unbuffered SDRAM (UDIMM, RDIMM, LRDIMM)
ECC Support	Yes
Speed	Up to PC3-14900 (1866MHz)
Max DIMM Size	Up to 8GB UDIMM, up to 32GB RDIMM
Max System Memory	UDIMM: up to 64GB (w/8GB modules) RDIMM: up to 256GB RDIMM (w/32GB modules)
<b>Ethernet</b>	
Vendor	Intel
Count	1
EEPROM	None (part of SPI flash)
Speeds	10/100/1000 Mbps
Functions	PXE, WOL, AMT (82579), NC-SI (82574), Jumbo Frames, Teaming
Connectors	(1) x RJ45 on Rear I/O

<b>Audio</b>	
Vendor	Realtek
Type	HD (5.1)
Internal Speaker	Yes, using SSM2211 amplifier
Connectors	(3) x Rear 3.5mm Jacks (Line In, Line Out, Microphone In) (2) x Front 3.5mm Jacks (Headphone out, Microphone In) (1) x 2-Pin Internal Speaker Header
<b>Video</b>	
Onboard	<Not Supported>
Adapter	(2) x PCI-E 3.0 16-Lane Slots Additional adapters may be supported in x4 slots for Spec Bids
Multi-GPU Support	BIOS supported, card dependent
<b>Storage</b>	
Floppy	None
IDE	None
SATA/SAS	(2) x SATA Connectors, Gen. 2 (AHCI) (2) x SATA Connectors, Gen. 3 (AHCI) (3) x SATA/SAS Connectors, Gen. 2 (SCU) (1) x eSATA Connector, Gen. 2 (eSATA bracket) <ul style="list-style-type: none"> <li>• SATA RAID 0,1, 5 supported natively</li> <li>• SAS RAID 0,1 and SATA RAID 0,1 supported via SAS Enablement Module</li> <li>• SAS RAID 0,1,5 and SATA RAID 0,1,5 supported via LSI 9260-8i adapter</li> <li>SAS RAID 0,1 5 and SATA RAID 0,1, 5 supported via LSI 9240-8i adapter (with RAID5 key)</li> </ul>
eSATA	(1) x eSATA Connector, Gen. 2, cabled to Slot via bracket
<b>Slots</b>	
Slot 1 (Near CPU)	4-Lane PCI-E v3.0 (16-Lane Mechanical) - Half Length, Full Height
Slot 2	16-Lane PCI-E v3.0 - Full Length, Full Height
Slot 3	PCI v2.3 - Full Length, Full Height
Slot 4	16-Lane PCI-E v3.0 - Full Length, Full Height
Slot 5	4-Lane PCI-E v2.0 Full Length, Full Height, open tailgate (RF 2.5)
Slot 6 (Near Edge)	PCI v2.3 - Half Length, Full Height
<b>Rear I/O</b>	
COM	(1) x Serial Port (COM1)
eSATA	(1) x eSATA Port (Gen. 2), optional via bracket
LPT	None
Video	<No Onboard Video>
Audio	Microphone-In, Line In, Line Out
Ethernet	(1) x RJ45
USB 2.0	(2) x USB 2.0 Ports
USB 3.0	(2) x USB 3.0 Ports
Firewire	None
<b>Internal I/O</b>	
USB 2.0	<ul style="list-style-type: none"> <li>• x Front Panel USB Header (2 ports, Base MTM)</li> <li>• x Media Card Reader Header</li> <li>• x Internal USB connector</li> </ul>
USB 3.0	<ul style="list-style-type: none"> <li>• x Front Panel USB 3.0 edge connector (2 ports)</li> </ul>
PS/2	(1) x 2-port PS/2 Header (Rear)
Audio	(1) x Front Panel Mic & Line-Out Header
COM2	None
Clear CMOS	3-Pin Clear CMOS Header
Speaker	2-Pin Internal Speaker Header
Chassis Intrusion	2-Pin Chassis Intrusion Switch Header
Firewire	None

**Thermal**

Fans	(1) x 4-Wire CPU Fans (1) x 5-Wire Rear Fans (1 header, two fans) (1) x 4-Wire Front Fan (2) x 5-Wire Memory Fan (not used on C30) (1) x 3-Wire PCH Fan (PCH fan not installed)
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**Power Connectors**

Main	(1) 24-Pin (2x12) ATX Standard
Memory & CPU	(2) 8-Pin (2x4) ATX 12V Standard
Graphics	(1) 4-Pin (2x2) ATX 12V Standard

**Security**

TPM	Version 1.2, Nuvoton NPCT421LA0WX (Base MTMs) Version 1.2, ST Micro ST33TPM12LPC (MTMs and later)
Asset ID	NXP PCA24S08
vPro	AMT 8.0
BIOS	
Vendor	AMI

**Ethernet**

The C30 motherboard implements an onboard gigabit Ethernet port via the Intel (82579) PHY. This integrated solution has support for the industry standard functions of Wake on LAN (WOL) and Preboot Execution Environment (PXE), Teaming, and Jumbo Frames. Additionally, for Manageability features, (82579) will support AMT 7.0.

**Audio**

The ALC662-VD chip from Realtek provides C30 with stereo audio capability that meets Windows7 Premium performance requirements. There are 2 front analog jacks, and 3 rear color-coded analog jacks.

**Clock Generator**

The clock generator chip on C30 is an ICS932SQ420B. It is compliant with the Intel requirement for CK420 clock generation, and had downstream support with a DB1900Z clock buffer.

**Chassis Summary****Chassis Info**

Chassis Format: Tower  
Chassis Dimension - cm: 444mm D x 130mm W x 427mm H  
Chassis Dimension - in: 17.48" D x 5.12" W x 16.81" H  
Chassis Weight = 40.7 lbs (18.5kg) maximum configuration  
Chassis color: Raven Black  
Power supply: 800W 90% Efficient

**2P Thermal Solutions**

A single unique heatsink design for the front CPU (CPU1) that supports up to 135W processors. The rear CPU (CPU2) heatsink design is common with S30 and D30, and also support up to 135W CPUs.

**Security & Serviceability****Physical Security and Serviceability**

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	Tool-less
Green Color Power LED on Front of Computer	Yes

Restore CD/DVD Set	Restore system to original factory shipping image - Can be obtained via Lenovo Support
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
Security Chip	Yes
Access Panel Key Lock	Yes
Boot Sequence Control	Yes
Padlock Support	Yes, loop in rear for optional padlock, prevents side panel removal
Boot without keyboard and/or mouse	Yes

## Operating Environment

### Air Temperature

- 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 package
- Storage: -10°C to 60°C (14°F to 140°F) without package
- Note: The allowable upper temperature limit decreases by 1°C (1.8°F) for every 300 m (1000 ft) above sea level.

### Humidity

- Operating: 10% to 80% (non-condensing)
- Storage: 10% to 90% (non-condensing)

### Altitude

- Operating: -50 to 10 000 ft (-15.2 to 3 048 m)

## Regulations and Standards

C30 is expected to be compliant to the Lenovo Standards Compliance Reference List

### EMC

FCC (DoC)/Canada  
 CE (EMC)  
 VCCI  
 JEIDA  
 C-Tick  
 BSMI  
 CCIB

### Safety

UL (C-UL)  
 TUV-GS  
 ISO-9241 - parts 3, 7, 8  
 NOM  
 IRAM  
 CCIB  
 PSB  
 CE (LVD)

## Energy Star

All C30 systems are designed to with the premise of maximizing energy efficiency. Select models will meet the workstation requirements outlined the Energy Star specification:

Energy Star Program Requirements for Computers: Version 6.0

### EPEAT™

C30 models which are Energy Star 6.0 compliant will also qualify for the EPEAT™ Gold rating. The Development team is currently assessing whether some or all of these models may also qualify for EPEAT™ Gold.

**EuP Lot-6 2012**

C30 systems are compliant with the EuP Lot-6 2012 standard for low power consumption. This is enabled by default for all systems shipping to EMEA, and can be toggled on or off in the system BIOS.

**SECTION II: SUPPORTED COMPONENTS****CPU Specifications**

## Part Description

**2S Processor SKUs - These SKUs have 2 QPI links and are targeted for dual CPU systems, but will also work on single CPU systems**

Intel Xeon E5-2697 v2 - 12 cores, 2.7 GHz, 8.0 QPI, 30MB Cache, DDR3-1866, Turbo, HT, 130W

Intel Xeon E5-2695 v2 - 12 cores, 2.4 GHz, 8.0 QPI, 30MB Cache, DDR3-1866, Turbo, HT, 115W

Intel Xeon E5-2690 v2 - 10 cores, 3.0 GHz, 8.0 QPI, 25MB Cache, DDR3-1866, Turbo, HT, 130W

Intel Xeon E5-2680 v2 - 10 cores, 2.8 GHz, 8.0 QPI, 25MB Cache, DDR3-1866, Turbo, HT, 115W

Intel Xeon E5-2670 v2 - 10 cores, 2.5 GHz, 8.0 QPI, 25MB Cache, DDR3-1866, Turbo, HT, 115W

Intel Xeon E5-2667 v2 - 8 cores, 3.3 GHz, 8.0 QPI, 25MB Cache, DDR3-1866, Turbo, HT, 130W

Intel Xeon E5-2660 v2 - 10 cores, 2.2 GHz, 8.0 QPI, 25MB Cache, DDR3-1866, Turbo, HT, 95W

Intel Xeon E5-2650 v2 - 8 cores, 2.6 GHz, 8.0 QPI, 20MB Cache, DDR3-1866, Turbo, HT, 95W

Intel Xeon E5-2643 v2 - 6 cores, 3.5 GHz, 8.0 QPI, 25MB Cache, DDR3-1866, Turbo, HT, 130W

Intel Xeon E5-2640 v2 - 8 cores, 2.0 GHz, 7.2 QPI, 20MB Cache, DDR3-1600, Turbo, HT, 95W

Intel Xeon E5-2637 v2 - 4 cores, 3.5 GHz, 8.0 QPI, 15MB Cache, DDR3-1866, Turbo, HT, 130W

Intel Xeon E5-2630 v2 - 6 cores, 2.6 GHz, 7.2 QPI, 15MB Cache, DDR3-1600, Turbo, HT, 80W

Intel Xeon E5-2620 v2 - 6 cores, 2.1 GHz, 7.2 QPI, 15MB Cache, DDR3-1600, Turbo, HT, 80W

Intel Xeon E5-2609 v2 - 4 cores, 2.5 GHz, 6.4 QPI, 10MB Cache, DDR3-1333, 80W

Intel Xeon E5-2603 v2 - 4 cores, 1.8 GHz, 6.4 QPI, 10MB Cache, DDR3-1333, 80W

**2S Low Power Processor SKUs - These SKUs have 2 QPI links and are targeted for dual CPU systems, but will also work on single CPU systems. They also have a lower TDP than standard power CPUs.**

Intel Xeon E5-2650L v2 - 10 cores, 1.7 GHz, 8.0 QPI, 25MB Cache, DDR3-1600, Turbo, HT, 70W

Intel Xeon E5-2630L v2 - 6 cores, 2.4 GHz, 7.2 QPI, 15MB Cache, DDR3-1600, Turbo, HT, 60W

**1S Processor SKUs - These SKUs have 1 QPI link and are targeted for single CPU configurations**

Intel Xeon E5-1660 v2 - 6 cores, 3.7 GHz, 15MB Cache, DDR3-1866, Turbo, HT, 130W

Intel Xeon E5-1650 v2 - 6 cores, 3.5 GHz, 15MB Cache, DDR3-1866, Turbo, HT, 130W

Intel Xeon E5-1620 v2 - 4 cores, 3.7 GHz, 10MB Cache, DDR3-1866, Turbo, HT, 130W

Intel Xeon E5-1607 v2 - 4 cores, 3.0 GHz, 10MB Cache, DDR3-1600, 130W

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

**RAM Specifications**

## Part Description

**UDIMMs - 1866MHz**

4GB DDR3 ECC UDIMM PC3-14900E (1866MHz) 1Rx8 4Gbit

8GB DDR3 ECC UDIMM PC3-14900E (1866MHz) 2Rx8 4Gbit

**RDIMMs - 1866MHz**

4GB DDR3 ECC RDIMM PC3-14900R (1866MHz) 1Rx8 4Gbit

8GB DDR3 ECC RDIMM PC3-14900R (1866MHz) 2Rx8 4Gbit

**UDIMMs - 1600MHz**

2GB DDR3 ECC UDIMM PC3-12800 (1600MHz) 1Rx8 2Gbit

4GB DDR3 ECC PC3-12800 (1600MHz) 2Rx8 2Gbit

8GB DDR3 ECC UDIMM PC3-12800 (1600MHz) 2Rx8 4Gbit

**RDIMMs - 1600MHz**

2GB DDR3 ECC RDIMM PC3-12800R (1600MHz) 1Rx8 2Gbit

4GB DDR3 ECC RDIMM PC3-12800R (1600MHz) 2Rx8 2Gbit

8GB DDR3 ECC RDIMM PC3-12800R (1600MHz) 2Rx4 2Gbit

16GB DDR3 ECC RDIMM PC3-12800R (1600MHz) 2Rx4 4Gbit

32GB DDR3 ECC RDIMM PC3-12800R (1333 MHz) 2Rx4 4Gbit (performance is configuration dependant)

**Memory Support Matrix**

Number of DIMMs		Single CPU							
		Processor 1							
		Ch 1	Ch 2	Ch 3	Ch 4	Ch 1	Ch 2	Ch 3	Ch 4
	DIMM 5	DIMM 1	DIMM 6	DIMM 2	DIMM 7	DIMM 3	DIMM 8	DIMM 4	
1		x							
2	NA	x	NA	x	NA		NA		
3		x		x		x			
4		x		x		x		x	

Number of DIMMs		Dual CPU														
		Processor 1						Processor 2								
		Ch 1	Ch 2	Ch 3	Ch 4	Ch 1	Ch 2	Ch 3	Ch 4	Ch 1	Ch 2	Ch 3	Ch 4			
	DIMM 5	DIMM 1	DIMM 6	DIMM 2	DIMM 7	DIMM 3	DIMM 8	DIMM 4	DIMM 5	DIMM 1	DIMM 6	DIMM 2	DIMM 7	DIMM 3	DIMM 8	DIMM 4
2		x								x						
4	NA	x	NA	x	NA		NA		NA	x	NA	x	NA		NA	
6		x		x		x				x		x		x		
8		x		x		x		x		x		x		x		x

**Storage - Hard Drive/SSD Specifications**

Part Description

**3.5" SATA Hard Disk Drive (HDD)**

250GB SATA - 7200rpm, 6Gb/s, 3.5"

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"

**2.5" SATA Hard Disk Drive (HDD)**

250GB SATA - 10000rpm, 6Gb/s, 2.5"

500GB SATA - 10000rpm, 6Gb/s, 2.5"

1TB SATA - 10000rpm, 6Gb/s, 2.5"

**3.5" SAS Hard Disk Drive (HDD)**

300GB SAS - 15000rpm, 6Gb/s, 3.5"

450GB SAS - 15000rpm, 6Gb/s, 3.5"

600GB SAS - 15000rpm, 6Gb/s, 3.5"

**2.5" SAS Hard Disk Drive (HDD)**

146GB SAS - 15000rpm, 6Gb/s, 2.5"

300GB SAS - 15000rpm, 6Gb/s, 2.5"

**2.5" SATA Solid State Drive (SSD)**

128GB SATA - Solid State Drive (SSD), 6Gb/s, MLC, 2.5"

180GB SATA - Solid State Drive (SSD), 6Gb/s, MLC, 2.5"

240GB SATA - Solid State Drive (SSD), 6Gb/s, MLC, 2.5"

256GB SATA - Solid State Drive (SSD), 6Gb/s, MLC, OPAL, 2.5"

#### mSATA Drives

128GB mSATA Drive, 6Gb/s, MLC

256GB mSATA Drive, 6Gb/s, MLC

#### 3.5" Hybrid Drives

1TB - 7200 rpm 8GB Flash

2TB - 7200 rpm 8GB Flash

### HDD to ODD Conversion

Kits are available through the special bid process to convert a 5.25" HDD bay into either a 3.5" or 2.5" optical drive.

### RAID

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.

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.

### Optional Hard Disk Drive Controllers:

#### LSI 9240-8i SATA/SAS RAID adapter

Description: PCIe x8 adapter card

Enables: Up to 5 SAS or SATA drives @ SATA3 (6GB/s) speeds, RAID 0,1,10

RAID 5 Support available with optional RAID key

#### SAS HDD enablement module (1-3 drives)

Description: S30 / C30 SAS HDD enablement module

Enables: Up to 3 SATA or SAS drives at SATA2 (3Gb/s) speeds, RAID 0,1

### Storage - Optical Drive

Part Description

DVD-ROM Drive - 16x/48x (SATA)

DVD Burner/CD-RW Rambo Drive (SATA)

Blu-Ray Burner Drive w/AACS encryption (SATA)

### Keyboard Specifications

Part Description

Preferred Pro Fullsize Keyboard (USB)

### Pointing Devices Specifications

Part Description

Optical Wheel Mouse (800 DPI), USB - red wheel

### Video Adapters Specifications

Part Description

NVIDIA NVS300 (DMS-59 to Dual DVI, DMS-59 to Dual DP) - 512MB GDDR3

NVIDIA NVS310 (Dual DP) 512MB DDR3

NVIDIA NVS315 (DMS-59) 1GB DDR3

NVIDIA NVS 510 (mini DP x 4) - 2GB DDR3

NVIDIA Quadro 410 (Dual link DVI, DP) 512MB DDR3



NVIDIA Quadro K600 (Dual link DVI, DP) - 1GB DDR3

NVIDIA Quadro K2000 (Dual link DVI, DP, DP) - 2GB GDDR5

NVIDIA Quadro K2000D (Dual link DVI x 2) - 2GB GDDR5

NVIDIA Quadro K4000 (Dual link DVI, DP, DP, Stereo 3D) - 3GB GDDR5

NVIDIA Quadro K5000 (Dual link DVI x 2, DP, DP) - 4GB GDDR5

NVIDIA Quadro 6000 (Dual link DVI, DP, DP, Stereo 3D) - 6GB GDDR5

#### SLI Implementations

2 x NVIDIA Quadro K5000 with SLI Cable

2 x NVIDIA Quadro 5000 with SLI Cable

2 x NVIDIA Quadro 5000

SLI Cable

#### Compute Adapters

NVIDIA Tesla K20 - 5GDDR5

### PCI/PCIe Adapters Specifications

#### Part Description

IEEE 1394a (Firewire-400) PCI Express x1 Adapter (2 external ports)

Intel 82574L Gigabit CT2 Desktop Ethernet Adapter

Intel 1 Gigabit ET Dual Port Server Adapter

USB 3.0 PCI Express x1 Adapter

SoundBlaster Recon3D Audio Card (PCIe x1)

### Speakers Specifications

#### Part Description

Lenovo Branded 2-Piece Speaker Set

Speaker Brick

## SECTION III: SYSTEM TECHNICAL SPECIFICATIONS

### Power Supply Specifications

Power Supply	800w PSU
Operating Voltage Range	90-264 VAC
Rated Voltage Range	100-127V / 200-240V
Rated Line Frequency	50/60Hz.
Operating Line Frequency Range	47Hz/63Hz
Rated Input Current	12A @ 100-127 VAC6A @ 200-240 VAC
Power Supply Fan	92x38mm, 2400rpm max
ENERGY STAR® qualified (Config Dependent)	YES
80 PLUS Compliant	YES, 80 PLUS Gold
Built-in Self Test (BIST) LED	YES
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	YES
Aux Power connectors	P3: One (1) 6-Pin (2x3) PCI-E Auxiliary Power Connector P4: One (1) 6-Pin/8-Pin (2x4) PCI-E Auxiliary Power Connector

[Click here to access the ThinkStation Power Calculator.](#)

### BIOS Specifications

#### Features

WMI Support	Compliant with Microsoft WBEM and the DMTF Common Information Model
ROM-Based Setup Utility (F1)	System Configuration Setup program available at power-on with F1 key
Bootblock Recovery	Recovers system BIOS when Flash ROM corrupted.

Replicated Setup	Saves System Configuration settings to file that can then be used replicated 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 event of decrease in system memory
Thermal Alert	Power-on Error message in event of fan failure
Asset Tag	Support ability to set SMBIOS Type 2 Baseboard Asset Tag field.
System/Emergency ROM Flash Recovery with Video	Support process to recover system BIOS when Flash ROM corrupted
Remote Wakeup/Remote Shutdown	System admin can power on/off a client computer from remote location to provide maintenance
Quick Resume time	Support for 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	Fans dynamically controlled by system BIOS based on temperature. User has ability to provide custom fan control table
Security	User and Administrator passwords can protect boot and ROM-base Setup. Chassis intrusion detection protect
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 base attacks.
Memory modes	Supports mirroring, lock step, and sparing memory modes
Windows 8 ready	Supports Windows 8 requirements - Secure flash, UEFI v 2.3.1 spec
Industry Standard Specification Support	
UEFI	Unified Extensible Firmware Interface v2.3.1
ACPI (Advanced Configuration and power Management Interface)	Advanced Configuration and Power Interface v4.0
ASF 2.0	DMTF Alert Standard Format Specification v2.0
ATA (IDE)	ATA Attachment 6 with Packet Interface (ATA/ATAPI-6)
CD Boot	"El Torito" Bootable CD-Rom Format Specification, Version 1.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	PCI Local Bus v3.0PC Firmware Specification 2.1
PCI Express	PCI Express Base Specification 3.0
SATA	Serial ATA Revision 3.0 Specification
TPM	Trusted Computing Group TPM Specification Version 1.2
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB	Universal Serial Bus Revision 1.1Universal Serial Bus v2.0Universal Serial Bus v3.0
SMBIOS	DMTF System Management Spec v2.7.1

## Social and Environmental Responsibility

### Quality Control

Lenovo is a member of an eco declaration system that enforces regular independent quality control

### Hazardous substances and preparation

Products do not contain more than; 0.1% lead, 0.01% cadmium, 0.1% mercury, 0.1% hexavalent chromium, 0.1% polybrominated biphenyls (PBB) or 0.1% polybrominated diphenyl ethers (PBDE). (See legal reference and Note B1

Products do not contain Asbestos

Products do not contain Ozone Depleting Substances: Chlorofluorocarbons (CFC), hydrobromofluorocarbons (HBFC), hydrochlorofluorocarbons (HCFC), Halons, carbontetrachloride, 1,1,1-trichloroethane, methyl bromide

Products do not contain more than; 0.005% polychlorinated biphenyl (PCB), 0.005% polychlorinated terphenyl (PCT) in preparation

Products do not contain more than 0.1% short chain chloroparaffins (SCCP) with 10-13 carbon atoms in the chain containing at least 48% per mass of chlorine in the SCCP

Parts with direct and prolonged skin contact do not release nickel in concentrations above 0.5 microgram/cm<sup>2</sup>/week

REACH Article 33 information about substances in articles is available at:  
[http://www.lenovo.com/social\\_responsibility/us/en/ThinkGreen\\_products.html#environment](http://www.lenovo.com/social_responsibility/us/en/ThinkGreen_products.html#environment)

**Batteries**

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

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

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"

**Safety, EMC connection to the telephone network and labeling**

The product complies with legally required safety standards as specified

The product complies with legally required standards for electromagnetic compatibility

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

The product is labeled to show conformance with applicable legal requirements

**Product packaging**

Packaging and packaging components do not contain more than 0.01% lead, mercury, cadmium and hexavalent chromium by weight of these together.

Plastic packaging material is marked according to ISO 11469 referring ISO 1043

The product packaging material is free from ozone depleting substances as specified in the Montreal Protocol

For more information on Lenovo social environmental practices visit:

[http://www.lenovo.com/social\\_responsibility/us/en/ThinkGreen\\_products.html#environment](http://www.lenovo.com/social_responsibility/us/en/ThinkGreen_products.html#environment)

**Manageability**

Industry Standard Specifications	This product meets the following industry standard specifications for manageability functionality: <ul style="list-style-type: none"> <li>• Intel LAN with AMT</li> </ul>
Remote Manageability Software Solutions	Lenovo ThinkStation is supported on the following remote manageability software consoles: <ul style="list-style-type: none"> <li>• Lenovo ThinkManagement Console</li> <li>• LANDesk Management Suite for ThinkVantage Technologies (<a href="http://www.landesk.com/lenovo">www.landesk.com/lenovo</a>)</li> <li>• Microsoft System Center Configuration Manager</li> </ul>
System Software Manager	Lenovo ThinkStation supports software management tools from the ThinkVantage System Update suite: <ul style="list-style-type: none"> <li>• System Update</li> <li>• Update Retriever</li> <li>• Thin Installer</li> </ul>
Service, Support, and Warranty	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.

Go to [www.lenovo.com/support](http://www.lenovo.com/support) and [www.lenovo.com/warranty](http://www.lenovo.com/warranty) for more details

**SECTION IV: TECHNICAL SPECIFICATIONS**

**HDD Specifications**

**3.5" SAS Hard Disk Drive (HDD)**

300GB SAS - 15000rpm, 6Gb/s, 3.5"

450GB SAS - 15000rpm, 6Gb/s, 3.5"

600GB SAS - 15000rpm, 6Gb/s, 3.5"

**2.5" SAS Hard Disk Drive (HDD)**

146GB SAS - 15000rpm, 6Gb/s, 2.5"

300GB SAS - 15000rpm, 6Gb/s, 2.5"

Specification	3.5" 15K	2.5" 15K
Interface		
Connector	SAS SFF-8482	
Transfer Rate (Gb/sec)	3Gb	

## Performance

Spindle Speed(RPM)	15,000 +/-	15,000 +/-
Power off to Spindle Stop(sec)	30 max	
DC Power to Drive Ready(sec)	30 max	
Receipt of Start Unit Command to Drive Ready(sec)	30 max	
Average Latency(msec)	2 +/- 0.25	
Full Stroke Seek for Read/Write(ms max)	8 / 9	

## Power Management

Input(VDC)	+5v +- 5%/12v +- 5%
Typical(Watts)	TBD
Idle(Watts)	TBD

## Dimensions

Height(mm - Max)	26.11	15
Width(mm)	101.6 +/- 0.25	69.85 +/- 0.25
Depth(mm - Max)	146.99	100 +/- 0.45
Weight(grams)	800 max	

## Temperature

Operating(C) Ambient	5 to 55
Operating(C) Base Casting	60 max
Non-Operating(C) Ambient	-40 to 70
Gradient(C per Hour)	20 max

## Shock

Operating(Gs @ 2ms)	60 max
Non-Operating(Gs @ 2ms)	250 max

## Part Description

**3.5" SATA Hard Disk Drive (HDD)**

250GB SATA - 7200rpm, 6Gb/s, 3.5"

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"

**2.5" SATA Hard Disk Drive (HDD)**

150GB SATA - 10000rpm, 6Gb/s, 2.5"

300GB SATA - 10000rpm, 6Gb/s, 2.5"

600GB SATA - 10000rpm, 6Gb/s, 2.5"

**2.5" SATA Solid State Drive (SSD)**

128GB SATA - Solid State Drive (SSD), 6Gb/s, MLC, 2.5"

256GB SATA - Solid State Drive (SSD), 6Gb/s, MLC, OPAL, 2.5"

**mSATA Drives**

128GB mSATA Drive, 6Gb/s, MLC

256GB mSATA Drive, 6Gb/s, MLC

## Specification

## Interface

Connector	SATA
-----------	------

	Ports	Single
	Transfer Rate	6Gb
Temperature		
Operational	Ambient (C)	0 to 55
	Base Casting (C)	60 max
	Gradient(C per Hour)	20 max
Non-Operational	Ambient(C)	-40 to 70
	Gradient(C per Hour)	30 max
Humidity		
Operational	Relative Non-Condensing Wet bulb (%)	5 to 90
	Gradient (% per hour)	20
Non-Operational	Relative Non-Condensing Wet bulb (%)	5 to 95
	Gradient (% per hour)	20
Altitude		
	Operating(feet)	-1000 to 10,000
	Non-Operating(feet)	-1000 to 40,000
Shock - All Axis		
Operational No Data loss. Data recovery is allowed	½ Sine @ 2ms (Read & Write) (G)	60
	Rotational (Rad/sec**2)	8.5
Non-Operational No damage allowed	½ Sine @ 2ms (G)	250
	Rotational (Rad/sec**2)	20,000

## HDD Controller Specifications

### LSI 9240-8i SATA/SAS RAID adapter

PCI Bus	PCI-Express 2.0 x8 lanes
PCI Modes	Bus Master DMA
RAID Levels	RAID 0, 1, 5, 10, 50 and JBOD mod
Data Transfer Rates	Up to 6 Gb/s per port
PCI Card Type	3.3V Add-in card
PCI Voltage	+12V ±10
PCI Power	13.5W
Bracket	Full Height and Low-Profile
Certification Level	PCI-Express 2.0
Internal Connectors	Two X4 Mini-SAS SFF8087 (vertical orientation)

## SSD Technical Specifications

### Solid State Drives for Workstations

Capacity	128GB, 180GB, 240GB, 256GB
Physical Size	Model Height (mm) 6.80 ± 0.20 Width (mm) 69.85 ± 0.25 Length (mm) 100.00 ± 0.25 Weight (gram) Max 58
Interface	SATA
Synchronous Transfer Rate	6Gb/s
Operating Temperature	0°C to 60°C (32° to 140°F)

## CD - RW Rambo Drive

Description	5.25-inch, half-height, tray-load
Mounting Orientation	Either horizontal or vertical
Interface Type	SATA/ATAPI
Dimensions	(WxHxD) 15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)
Disc Formats	DVD-RAMDVD+RDVD+RWDVD+R DLDVD-R DL

DVD-R  
 DVD-RW  
 CD-R  
 CD-RW

### Disc Capacity

DVD-ROM	8.5 GB DL or 4.7 GB standard
Full Stroke DVD	< 250 ms (seek)
Full Stroke CD	< 210 ms (seek)

### Maximum Data Transfer Rates

CD ROM Read	CD-ROM, CD-R Up to 40X CD-RW Up to 32X
DVD ROM Read	DVD-RAM Up to 12X DVD+RW Up to 8X DVD-RW Up to 8X DVD+R DL Up to 8X DVD+R Up to 16X DVD-R Up to 16X

### Power

Source	SATA DC power receptacle
DC Power Requirements	5 VDC $\pm$ 5%-100 mV ripple p-p 12 VDC $\pm$ 5%-200 mV ripple p-p
DC Current	5 VDC - <1000 mA typical, <1600 mA maximum 12 VDC - <600 mA typical, <1400 mA maximum

### Operating Environmental

Temperature	5° to 50° C (41° to 122° F)
Relative Humidity	10% to 90%
Maximum Wet Bulb Temperature	30° C (86° F)

### Operating Systems Supported

Windows 7 Professional 32-bit and 64-bit,  
 Windows XP Professional or Windows XP Home 32\*.  
 Red Hat Enterprise Linux(RHEL) 6  
 Desktop/Workstation. No driver is required for this device. Native support is provided by the operating system.

### Kit Contents

SATA SuperMulti DVD Writer Drive, Roxio  
 Easy Media Creator software, Intervideo  
 WinDVD Software, installation guide, and  
 DVD+R media.

### DVD - ROM Drive

Description	5.25-inch, half-height, tray-load
Mounting Orientation	Either horizontal or vertical
Interface Type	SATA/ATAPI
Dimensions	(WxHxD) 15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)
Disc Capacity DVD-ROM	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB

### Access Times

DVD-ROM Single Layer	< 140 ms (typical)
CD-ROM Mode 1	< 125 ms (typical)
Full Stroke DVD	< 250 ms (seek)
Full Stroke CD	< 210 ms (seek)

### Power

Source	SATA DC power receptacle
DC Power Requirements	5 VDC $\pm$ 5%-100 mV ripple p-p 12 VDC $\pm$ 5%-200 mV ripple p-p
DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum

### Operating Environmental

Temperature	5° to 50° C (41° to 122° F)
Relative Humidity	10% to 90%
Maximum Wet Bulb Temperature	30° C (86° F)

### Operating Systems Supported

Windows 7 Professional 32-bit and 64-bit,  
 Windows XP Professional or Windows XP Home 32\*.  
 Red Hat Enterprise Linux(RHEL) WS4\*\*, 5, 6  
 Desktop/Workstation. No driver is required for this device. Native support is provided by the operating system.

### Blu-Ray Burner Drive w/ AACS encryption

Description	5.25-inch, half-height, tray-load
Mounting Orientation	Either horizontal or vertical
Interface Type	SATA
Dimensions	(WxHxD) 15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)
Disc Formats	BD-ROM BD-RBD-REDVD-RAMDVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW

### Disc Capacity

DVD-ROM	8.5 GB DL or 4.7 GB standard
Blu-ray	50 GB DL or 25 GB standard
Full Stroke DVD	< 250 ms (seek)
Full Stroke CD	< 210 ms (seek)
Blu-ray	<275 ms (seek)
Startup Time	BD-ROM (SL/DL) 25S / 28S BD-R (SL/DL) 25S / 28S BD-RE (SL/DL) 25S / 28S DVD-ROM 25S DVD+R (SL/DL) 25S / 25S DVD+RW 25S DVD-RAM 45S CD-ROM 45S
Maximum Data Transfer Rates CD ROM Read	CD-ROM CD-RCD-RW Up to 40X Up to 40X Up to 40X
DVD ROM Read	DVD-RAM Up to 5X DVD+RW Up to 10X DVD-RW Up to 10X DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 12X DVD-R Up to 12X
Blu-Ray	BD-ROM Up to 6X BD-ROM DL Up to 4.8X BD-R Up to 6X BD-R DL Up to 4.8X BD-RE SL/DL Up to 4.8X

### Power

Source	SATA DC power receptacle
DC Power Requirements	5 VDC $\pm$ 5%-100 mV ripple p-p 12 VDC $\pm$ 10%-100 mV ripple p-p
DC Current	5 VDC -900 mA typical, 1200 mA maximum 12 VDC -1000 mA typical, 1600 mA maximum

### Operating Environmental

Temperature	5° to 50° C (41° to 122° F)
Relative Humidity	15% to 80%

Maximum Wet Bulb Temperature

30° C (86° F)

#### Operating Systems Supported

Windows 7 Professional 32-bit and 64-bit,  
Windows XP, Professional or Windows XP Home 32\*.  
Red Hat Enterprise Linux(RHEL) WS 6

#### Kit Contents

Blue Laser RW Drive, Roxio Easy Media  
Creator software, Intervideo WinDVD  
Software, installation guide.

#### Disclaimer

As Blu-Ray is a new format containing new technologies, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-Ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.

#### Video Cards

##### NVIDIA NVS 300 512MB Graphics Card

###### Form Factor

2.7 inches (H) x 5.7 inches (L), Half-Height

###### Graphics Controller

NVIDIA NVS 300 Graphics Board

###### Bus Type

PCI Express x16, Generation 2.0

###### Memory

512 MB GDDR3 SDRAM unified graphics memory

###### Connectors

DMS-59

Includes DMS-59 to Dual DVI-I adapter or DMS-59 to Dual DP adapter

###### Maximum Resolution

DVI: two digital displays up to 1920 x 1200

DisplayPort: two digital displays up to 2560 x 1600

VGA: two analog displays up to 1920 x 1080

#### Image Quality Features

##### Display Output

This card support up to two displays: Drives DVI enabled digital displays at resolutions up to 1920 x 1200 at 60 Hz with reduced blanking Drives DisplayPort enabled digital displays at resolutions up to 2560 x 1600 at 60 Hz with reduced blanking (through optional DMS-59 to DisplayPort adapter)

Drives VGA enabled analog displays at resolutions up to 1920 x 1080 (through optional DMS-59 to VGA adapter)

##### Supported Graphics APIs

OGL 3.3

DirectX 10.1

##### Available Graphics Drivers

Genuine Windows 7 Professional (64-bit and 32-bit)

Microsoft Windows XP Professional (64-bit and 32-bit)

Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation

##### Power Consumption

<18 Watts

##### NVIDIA NVS 310 512MB Graphics Card

###### Form Factor

Low Profile: 2.713 inches in height x 6.150 inches in length



**Graphics Controller**  
NVIDIA NVS 310**Bus Type**

PCI Express x16, 2.0 compliant

**Memory**

Size: 512MB DDR3

Clock: 875Mhz

Memory Bandwidth: 14GB/s

**Connectors**

2 x DisplayPort 1.2

**Maximum Resolution**

Up to 2560 x 1600 (digital display) per display.

**Image Quality Features**

See Display Output section.

The following video formats are supported:

- MPEG2
- MPEG4 Part 2 Advanced Simple Profile
- H.264 SVC codec support
- Support for 3D Blu Ray
- VC1
- DivX version 3.11 and later
- MVC

A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The NVS 310 GPU provides hardware acceleration for the computationally intensive parts of video processing, as well as provides improved video playback speeds via faster decode and transcode.

**Display Output**

Up to 2 displays in the following configurations:

Drives two DisplayPort enabled digital display at resolutions up to 2560 x 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card Supports 2 monitors up to resolution of 1920 x 1200 at 60 Hz with reduced blanking using DisplayPort 1.2 multi stream topology technology.

**DVI-D output:**

Drives two digital display at resolutions up to 1920 x 1200 at 60Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors Drives two digital display at resolutions up to 2560x 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors HDMI output:

NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 x 1080P at 60 Hz using DisplayPort to HDMI cable adaptors

**VGA display output:**

Drives two analog display at resolutions up to 1920 x 1200 at 60 Hz using DisplayPort to VGA cable adaptors

**Shading Architecture**

Shader Model 5.0

**Supported Graphics APIs**

DX11, OpenGL 4.1

**Available Graphics Drivers**

Genuine Windows 7 Professional (64-bit and 32-bit)

Microsoft Windows XP Professional (64-bit and 32-bit)

Red Hat Enterprise Linux(RHEL)

**Power Consumption**

19.5 Watts

**Note**

The thermal solution used on this card is an active fan heatsink.

**NVIDIA NVS 315 1GB PCIe Graphics Card****Form Factor**

Low Profile, 1/2 length Active cooling

**Bus Type**

PCI Express x16, Generation 2.0

**Memory**

1GB GDDR3

**Connectors**

DMS59

**Maximum Resolution**

DisplayPort: 2560 x 1600

DVI: 1920 x 1200

VGA: 2048 x 1536

**Supported Graphics APIs**

OpenGL 4.1 DirectX 11

**NVIDIA Quadro NVS 510**CUDA Cores

192

**Memory Size Total**

2.0 GB DDR3

**Memory Interface**

128-bit

**Memory Bandwidth (GB/sec)**

28.5

**Display Connector**

Mini DisplayPort (mDP)

**# of Connectors**

4

**DisplayPort**

4

**Single-Link DVI-D**4<sup>1</sup>**Dual-Link DVI-D**4<sup>2</sup>**VGA**4<sup>3</sup>**Maximum Display Resolution (Digital @ 60Hz)**3840×2160<sup>4</sup>**Maximum Display Resolution (Analog @ 60 Hz)**1920×1200<sup>5</sup>**Number of Slots**

1

**Audio Support (via DisplayPort)**

✓

1 using mDP to SL-DVI, or included mDP-DP Cable with a DP to SL-DVI Cable Adaptor

2 using included mDP-DP cable with DP to DL-DVI Cable Adaptor

3 using included mDP-DP cable with DP to VGA Cable Adaptor

- 4 Through native DisplayPort (DP)
- 5 Through DP to VGA Cable Adaptor

## NVIDIA Quadro 410 512MB Graphics

### Form Factor

Low Profile: 2.713 inches × 5.7 inches, single slot

### Graphics Controller

NVIDIA Quadro 410

### Bus Type

PCI Express x16, 3.0 compliant

### Memory

Size: 512MB DDR3  
Clock: 900MHz  
Memory Bandwidth: 14GB/s

### Connectors

One dual-link DVI-I connector  
One DisplayPort connector

### Maximum Resolution

Up to 2560 × 1600 (digital display) per display.

### RAMDAC

400 MHz integrated RAMDAC

### Display Output

Maximum resolution over DisplayPort: 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)  
Maximum resolution over DVI port: 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)  
Maximum resolution over VGA (through DVI to VGA cable): 2048 × 1536 × 32 bpp at 85 Hz

### Shading Architecture

Shader Model 5.0

### Supported Graphics APIs

DX11, OpenGL 4.2

### Available Graphics Drivers

Genuine Windows 7 Professional (64-bit and 32-bit)  
Microsoft Windows XP Professional (64-bit and 32-bit)  
Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation

### Power Consumption

< 35 Watts

## NVIDIA Quadro K600

CUDA Parallel-Processing Cores  
192

### Frame Buffer Memory

1 GB DDR3

### Max Power Consumption

41W

### Graphics Bus

PCI Express 2.0 x16

### Display Connectors

DVI-I (1), DP 1.2 (1)

### Form Factor

2.713" H x 6.3 L Single Slot

## NVIDIA Quadro K2000

CUDA Parallel-Processing Cores  
384

**Frame Buffer Memory**  
2 GB GDDR5

**Max Power Consumption**  
51W

**Graphics Bus**  
PCI Express 2.0 x16

**Display Connectors**  
DVI-I (1), DP 1.2 (1)

**Form Factor**  
4.376" H x 7.97 L Single Slot

**NVIDIA Quadro K4000**  
CUDA Parallel-Processing Cores  
768

**Frame Buffer Memory**  
3 GB GDDR5

**Max Power Consumption**  
80W

**Graphics Bus**  
PCI Express 2.0 x16

**Display Connectors**  
DVI-I (1), DP 1.2 (2)

**Form Factor**  
4.376" H x 9.5 L Single Slot

**NVIDIA Quadro K5000 4GB Graphics Card**

CUDA Cores  
1536

**Single Precision Compute Performance**  
2.1 Teraflops

**Memory Size Total**  
4GB GDDR5

**Memory Interface**  
256-bit

**Memory Bandwidth (GB/sec)**  
173 GB/s

**Dual Link DVI-I**  
1

**Dual Link DVI-D**  
1

**DisplayPort 1.2**  
2

**# of Digital Outputs**  
4

**Stereo (3-pin Mini-DIN)**  
Optional

**Maximum Display Resolution (Digital)**  
DVI-DL: Up to 330M Pixels/sec: (ex 1920×1200@120Hz, 2560×1600@60Hz)  
DisplayPort 1.2: Up to 540M Pixels/sec & 17.3 Gbps data rate

(ex 3840×2160@60Hz 30bpp, 2560×1440@120Hz 30bpp, 4096×2160@24Hz 36bpp, 4096×2160@50Hz 30bpp )

## NVIDIA Quadro 6000 6GB Graphics Card

### Form Factor

4.376" H x 9.75" L  
Dual Slot

### Graphics Controller

NVIDIA Quadro 6000 Graphics Card

### Bus Type

PCI Express 2.0 x16

### Memory

6 GB GDDR5  
384-bit  
ECC Memory

### Connectors

1 DVI-I output, 2 DisplayPort outputs, 1 Stereo(3-pin mini DIN);  
One DP to DVI adapter included with card  
DVI to VGA, DisplayPort to VGA and DisplayPort to dual link DVI  
adapters available as accessories

### Maximum Resolution

Dual DisplayPort (up to 2560 x 1600 @ 60Hz and 1920×1200 @ 120Hz)  
Dual-link DVI-I output (up to 2560 x 1600 @ 60Hz and 1920×1200 @  
120Hz)

### Image Quality Features

30-bit color  
Up to 16K x16K texture and render processing  
Transparent multisampling and super sampling  
16x angle independent anisotropic filtering  
128-bit floating point performance  
32-bit per-component floating point texture filtering and blending  
64x full scene antialiasing (FSAA) / 128x FSAA in SLI Mode  
Support for any combination of two connected displays  
DisplayPort 1.1a, HDMI 1.3a, and HDCP support  
NVIDIA 3D Vision™ technology, 3D DLP, Interleaved, and other  
3D stereo format support  
Full OpenGL quad buffered stereo support  
Underscan/overscan compensation and hardware scaling  
NVIDIA nView® multi-display technology

### Shading Architecture

Shader Model 5.0

### Supported Graphics APIs

OpenGL 4.0  
DirectX 11  
CUDA API support includes:  
CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

### Available Graphics Drivers

Genuine Windows 7 Professional (64-bit and 32-bit)  
Microsoft Windows XP Professional (64-bit and 32-bit)  
Red Hat Enterprise Linux (RHEL) 6 Desktop/Workstation

### Power Consumption

<250 Watts

## NVIDIA Tesla C2075 Compute Processor

### Form Factor

4.376 inches by 9.75 inches  
Dual Slot

### System Interface

PCI Express Gen2 ×16

### Video Outputs

One Dual Link DVI-I

(Video output on this connector is not supported in Maximus configurations per NVIDIA)

#### Memory

6GB GDDR5

#### Peak Memory Bandwidth

+170 GB/s

#### Supported APIs

CUDA API support includes:

CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

#### Supported Operating Systems

Genuine Windows 7 Professional (64-bit)

Genuine Windows Vista Business (64-bit)

Microsoft Windows XP Professional (64-bit)

Red Hat Enterprise Linux (RHEL) 6 Desktop/Workstation (64-bit)

#### Processor Cores

448 CUDA cores

#### Power Consumption

-215 Watts

#### Audio Devices

##### SoundBlaster Recon3D Audio Card (PCIe x1)

24-bit Analog-to-Digital conversion of analog inputs	96kHz sample rate
24-bit Digital-to-Analog conversion of digital sources	96kHz to analog
16-bit to 24-bit recording sampling rates	8,11.025,16, 22.05, 24, 32, 44.1, 48 and 96kHz
16-bit to 24-bit playback sampling rates	8,11.025,16, 22.05, 24, 32, 44.1, 48, 96 and 192kHz
Rear Panel Connectivity	Line in / Microphone In: Shared 1/8" mini jack Headphone: 1 x 1/8" mini jack Speaker Out: 3x 1/8" mini jacks Optical Out: TOSLINK Optical In: TOSLINK
Speaker Support	Stereo/2.1 Speakers 5.1 Speakers Headphones
Bus Connection	PCI Express 1x
Package Contents	Sound Card Quick Start leaflet Installation CD containing: <ul style="list-style-type: none"> <li>• Drivers for Windows®</li> <li>• Creative Software Suite</li> <li>• User's Guide</li> </ul>
Software	Sound Blaster Recon3D PCIe Control Panel <ul style="list-style-type: none"> <li>• THX® TruStudio Pro™ effects</li> <li>• THX® TruStudio Pro Surround™</li> <li>• THX® TruStudio Pro Crystalizer™</li> <li>• THX® TruStudio Pro Bass™</li> <li>• THX® TruStudio Pro Smart Volume™</li> <li>• THX® TruStudio Pro Dialog Plus™</li> </ul> CrystalVoice effects <ul style="list-style-type: none"> <li>• CrystalVoice™ Acoustic Echo Cancellation</li> <li>• CrystalVoice™ Noise Reduction</li> <li>• CrystalVoice™ Smart Volume</li> <li>• CrystalVoice™ FX</li> <li>• CrystalVoice™ Focus</li> </ul> EAX Advanced HD OpenAL Creative Alchemy
Minimum System Requirements	Intel® Core™ 2 Duo or AMD® equivalent processor, 2.2 GHz or faster Intel®, AMD® or 100% compatible motherboard Microsoft® Windows® 7 (32/64-bit) 1 GB RAM 600 MB of free hard disk space Available PCI Express® (x1, x4 or x16) slot Available CD-ROM or DVD-ROM drive

#### Networking

##### Intel 82574L Gigabit CT2 Desktop Ethernet Adapter

Connector RJ-45

Controller	Intel 82574L
Memory	Integrated Dual 48K configurable transit receive FIFO Buffers
Data Rates Supported	10/100/1000 Mbps
Compliance	IEEE 802.1p, Quality of Service (QoS) Support
Bus Architecture	PCI-E 1.1
Typical Power Consumption	1.9W
Operating Temperature	32° to 131° F (0° to 55° C)
Storage Humidity	90% at 35°C
Dimensions (H x W x D)	12cm x 5.53cm x 11.92cm
Operating System Driver Support	Windows 7 Professional 32-bit and 64-bit, Windows XP Professional 64-bit, Red Hat Enterprise Linux 4 (4.8 or newer), 5 (5.3 or newer), 6

#### Intel 1 Gigabit ET Dual Port Server Adapter

Cabling Type	Category-5 up to 100m
Bracket Height	Low Profile & Full Height
Max TDP	2.9 W
<b>Networking Specifications</b>	
# of Ports	Dual
System Interface Type	PCIe v2.0 (2.5GT/s)
Intel® Virtualization Technology for Connectivity (VT-c)	VMDq, VMDc
Speed & Slot Width	2.5 GT/s, x4 Lane
Controller	Intel 82576

#### USB 3.0

Interface:	Single-Lane (x1) PCI Express Gen2
Mode:	Universal Serial Bus 3.0
Controller:	Renesas (NEC) μPD720200
PCB Version:	Ver1.1
Port:	2 external USB3.0 ports
Speed:	Data Transfer rate of 1.5/12/480/5000 Mbps. Low Speed (1.5Mbps), Full Speed(12Mbps), High Speed(480Mbps), Super Speed(5Gpbs)
Power Output:	+5V / 900mA (each port)
Bracket:	Standard 121mm / Low Profile 79.2mm
O.S. support:	Windows XP/2003/Vista/7/2008, (32/64-bit) Linux 2.6.31 or later (Linux OS already implemented USB3.0 driver)
Environment:	Operation temp. 0 °C ~ 57 °C
Operation humidity:	5 ~ 95% RH
Storage temp.	-20 °C ~ 85 °C

#### IEEE 1394a (Firewire-400) PCI Express x1 Adapter

Data Transfer Rate	Supports up to 400 Mbps
Devices Supported	IEEE-1394 compliant devices
Bus Type	PCIe card full height PCIe slots
Ports	One IEEE-1394a 6-Pin Connector
System Requirements	Windows 7 Professional 32-bit and 64-bit, Microsoft® Windows® XP Professional. Not supported on Linux. Pentium® III or higher processor 128-MB RAM 1-GB Hard Drive CD-ROM drive Built in sound system Available PCI slot
Temperature - Operating	50° to 131° F (10° to 55° C)
Temperature - Storage	-22° to 140° F (-30° to 60° C)

Relative Humidity - Operating	20% to 80%
Compliances	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
Operating Systems Supported	Windows 7 Professional 32-bit and 64-bit, Windows® XP Professional, XP Professional 64-bit. Not supported on Linux