DELL PRECISION™ T7600

Technical
Guidebook
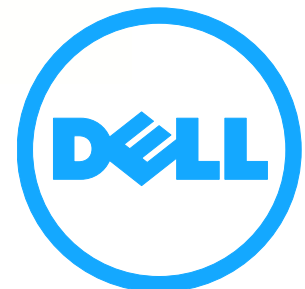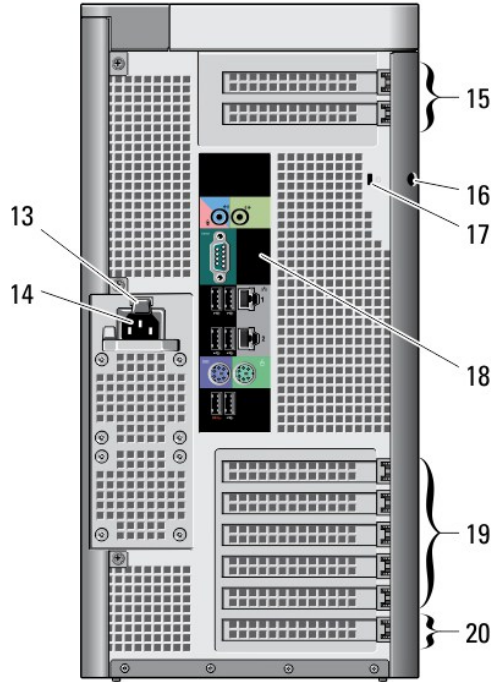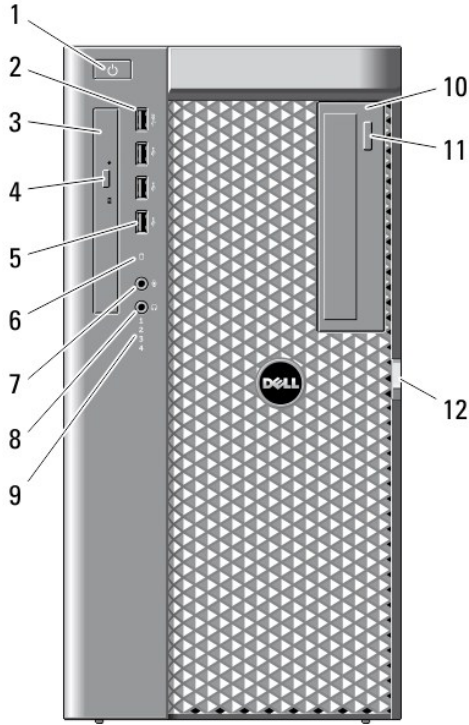
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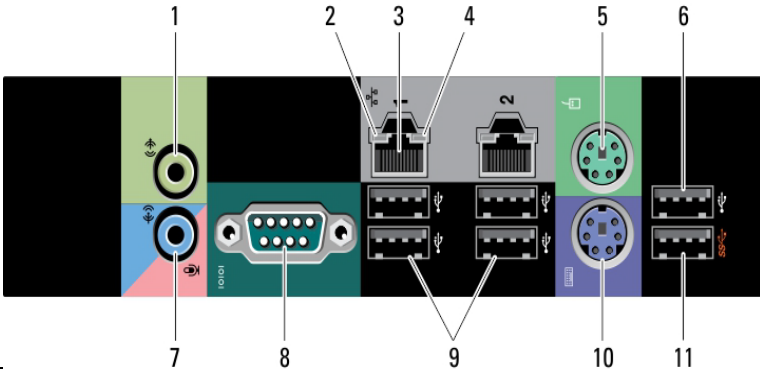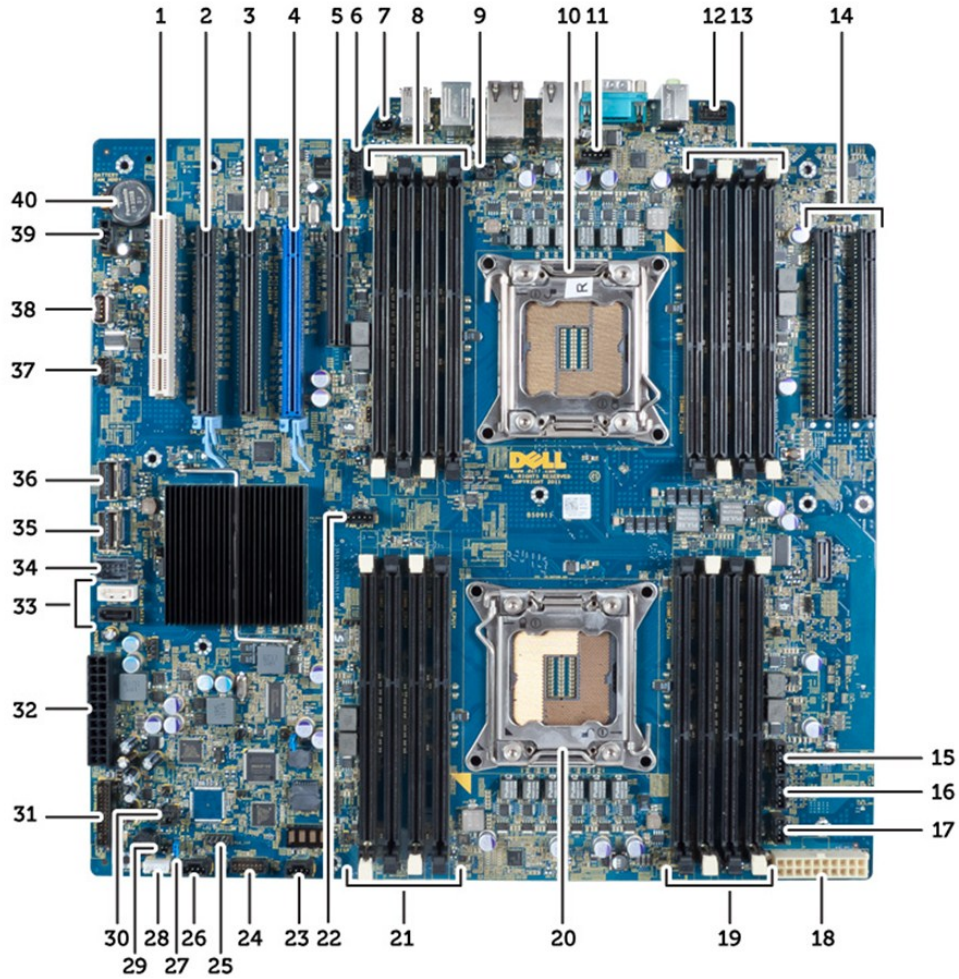
System Board Components

Number	Name	Number	Name
1	PCI slot	13	DIMM slots (available only when optional second CPU is installed)
2	PCIe x16 slot	14	PCIe X16 slots (available only when optional second CPU is installed)
3	PCIe x16 slot (wired as x4)	15	HDD3 fan connector
4	Accelerated graphics port (PCIe x16)	16	HDD2 fan connector
5	PCIe open-ended slot (wired as x4)	17	System fan 1 connector
6	USB 3.0 front panel connector	18	24-pin power2 connector
7	Intruder	19	DIMM slots
8	DIMM slots (available only when optional second CPU is installed)	20	CPU1
9	(not populated)	21	DIMM slots
10	CPU2	22	CPU1 fan socket
11	CPU2 fan socket	23	System 2 fan connector
12	Front panel audio connector	24	(not populated)

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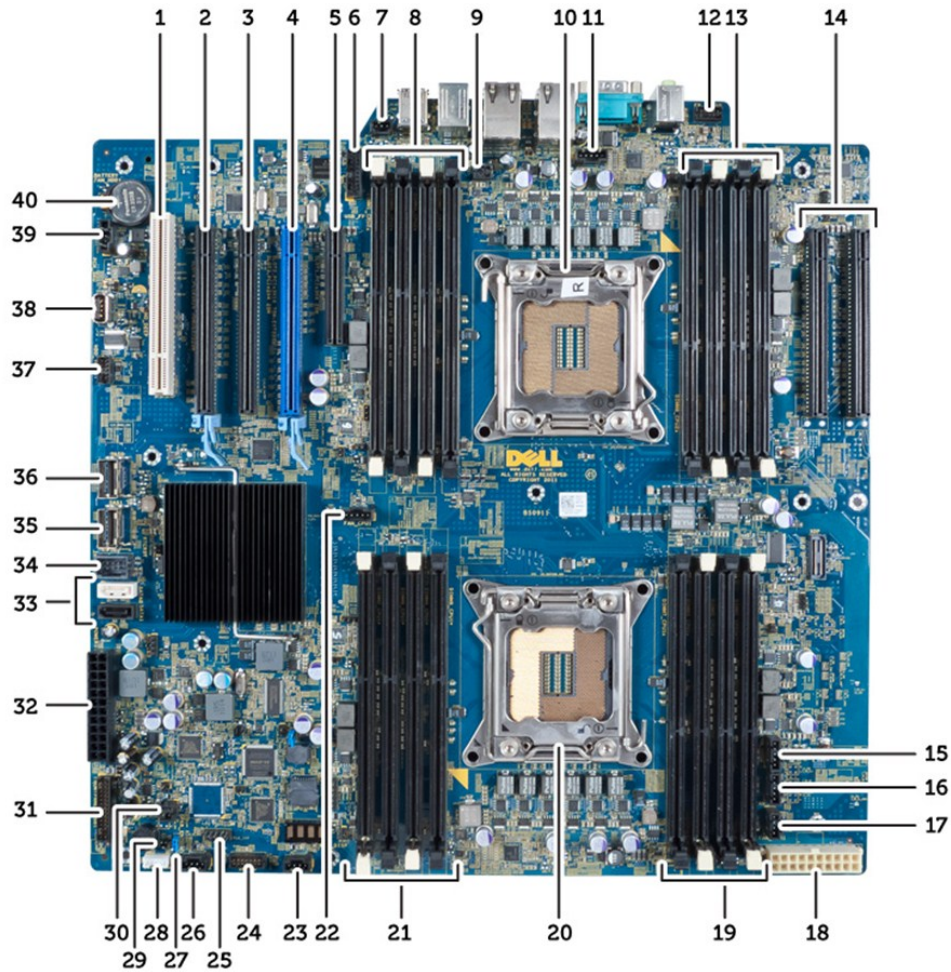
System Board Components (continued)

Number	Name	Number	Name
25	(not populated)	33	SATA connectors
26	System 3 fan connector	34	Internal USB 2.0 connector
27	Speaker enable	35	SAS0 connector -disabled
28	Internal speaker connector	36	SAS1 connector -disabled
29	(not populated)	37	HDD temperature sensor con-nector
30	Remote power enable	38	Internal USB 2.0 connector
31	Front panel & USB 2.0 connector	39	HDD1 fan connector
32	24-pin power1 connector	40	Battery

MARKETING SYSTEM CONFIGURATIONS

NOTE: Offerings may vary by country. For more information regarding the configuration of your computer, click Start>Help and Support and select the option to view information about your computer.

OPERATING SYSTEMS

Windows 7® operating system—	Factory Installed Microsoft® Windows 7® Professional (32 and 64 bit), Microsoft® Windows 7® Ultimate (32 and 64 bit),
Windows Vista® operating system—	Driver availability only via Dell.com Windows Vista® Business SP2 (32 and 64 bit), Windows Vista® Ultimate SP2 (32 bit and 64 bit)
Windows XP® operating system	Driver availability only via Dell.com Microsoft® Windows XP® Professional (32 and 64 bit), **Note:** Loading and booting an XP image requires a discrete PCIe hard disk controller (like the PERC H310 or PERC H710P) with XP driver
Red Hat Enterprise Linux	RHEL workstation 6.1 Factory installed RHEL 5.7 supported
Other	FreeDOS drop in the box for (N-series), Ubuntu® Linux version 11.10 (factory installed in China **only**)

CHIPSET

Chipset	Intel C600 Chipset
Non-volatile memory on chipset	
BIOS Configuration SPI (Serial Peripheral Interface)	64Mbit (8MB) & 32Mbit (4MB)
TPM 1.2 Security Device (Trusted Platform Module)[1]	18KB
Non-TPM	Available in select countries
NIC EEPROM	LOM configuration contained within SPI_FLASH – no dedicated LOM EEPROM

PROCESSOR

NOTE: Global Standard Products (GSP) are a subset of Dell's relationship products that are managed for availability and synchro-nized transitions on a worldwide basis. They ensure the same platform is available for purchase globally. This allows customers to reduce the number of configurations managed on a worldwide basis, thereby reducing their costs. They also enable companies to implement global IT standards by locking in specific product configurations worldwide. The following GSP processors identi-fied below will be made available to Dell customers.

NOTE: Processor numbers are not a measure of performance. Processor availability subject to change and may vary by region/country.

Intel® Eight Core Processors	
Intel® Xeon E5-2687W 3.16GHz, 20M, 8.0GT/s, 150W VT-x, VT-d, TXT (vPro™)	
Intel® Xeon E5-2680 2.7GHz, 20M, 8.0GT/s, 130W VT-x, VT-d, TXT (vPro™)	X—GSP
Intel® Xeon E5-2665 2.4GHz, 20M, 8.0GT/s, 115W VT-x, VT-d, TXT (vPro™)	
Intel® Xeon E5-2650 2.0GHz, 20M, 8.0GT/s, 95W VT-x, VT-d, TXT (vPro™)	
Intel® Six Core Processors	
Intel® Xeon E5-2667 2.9GHz, 15M, 8.0GT/s, 130W VT-x, VT-d, TXT (vPro™)	X—GSP
Intel® Xeon E5-2630 2.3GHz, 15M, 7.2GT/s, 95W VT-x, VT-d, TXT (vPro™)	X—GSP
Intel® Xeon E5-2620 2.0GHz, 15M, 7.2GT/s, 95W VT-x, VT-d, TXT (vPro™)	X—GSP
Intel® Four Core Processors	
Intel® Xeon E5-2643 3.30GHz, 10M, 8.0GT/s, 130W VT-x, VT-d, TXT (vPro™)	X—GSP
Intel® Xeon E5-2609 2.4GHz, 10M, 6.4GT/s, 80W VT-x, VT-d, TXT (vPro™)	X—GSP
Intel® Xeon E5-2603 1.8GHz, 10M, 6.4GT/s, 80W VT-x, VT-d, TXT (vPro™)	

MEMORY

NOTES: The Dell Precision T7600 has a four channel memory bus architecture. Dell recommends that all four memory channels be populated with DIMMs for maximum memory performance.

Maximum memory speed is tied to processor.

1600MHz memory will run at reduced speeds - 1333MHz with 7.2GT/s processors and at 1066MHz with 6.4GT/s processors

1333MHz memory will run at reduced speed   - 1066MHz with 6.4GT/s processors

Type:	DDR3 RDIMM (ECC)/ LRDIMM (ECC)
Max Frequency	1600 MHz RDIMM/1333MHz LRDIMM
(DIMM Slots	8 or 16 (with 2nd CPU installed)
DIMM Capacities	Up to 32GB (LRDIMM)
Minimum Memory	4GB (8GB with 2nd CPU installed
Maximum System Memory	512GB[1]
Memory configurations	
LRDIMM ECC Memory	
512GB (16x 32GB) DDR3, 1333 MHz	X
256GB (8x 32GB) DDR3, 1333 MHz	X
RDIMM ECC Memory	
256GB (16x 16GB) DDR3, 1600 MHz	X
256GB (16x 16GB) DDR3, 1600 MHz	X
128GB (16x 8GB) DDR3, 1600 MHz	X
128GB (8 x 16GB) DDR3, 1600 MHz	X
64GB (8 x 8GB) DDR3, 1600 MHz	X
64GB (4 x 16GB) DDR3, 1600 MHz	X
32GB (4 x 8GB) DDR3, 1600 MHz	X
16GB (4 x 4GB) DDR3, 1333/1600 MHz	X
8GB (4 x 2GB) DDR3, 1333/1600 MHz	X
4GB (2 x 2GB) DDR3, 1333/1600 MHz, **Single CPU only**	X

[1]The total amount of available memory will be less than 4GB. The amount less depends on the actual system configuration. To fully utilize 4GB or more of memory requires a 64-bit enabled processor and 64-bit operating system.

GRAPHICS/VIDEO CONTROLLER

NOTE: System supports full height (FH) cards unless specified
NOTE: Dual Graphic options (incl. dual C2075 Tesla cards) available on select cards. Dual Graphics with NVIDIA SLI (Scalable Link Interface) options available

Optional Graphic/Video Options	Included Dongle
High End 3D	
6.0GB NVIDIA Quadro 6000 with (2) DP and (1) DVI	(1) DP-DVI
2.5GB NVIDIA Quadro 5000 with (2) DP and (1) DVI	(1), DP-DVI, (1) DVI-VGA
Mid-range 3D	
2.0GB NVIDIA Quadro 4000 with (2) DP and (1) DVI	(1) DP-DVI, (1) DVI-VGA
2.0GB AMD FirePro V7900 with (4) DP	(1) DP-DVI
1.0GB NVIDIA Quadro 2000 with (2) DP and (1) DVI	(1) DP—DVI, (1) DVI-VGA
2.0GB AMD FirePro V5900 with (2) DP and (1) DVI	1) DP—DVI
Entry 3D	
1.0GB NVIDIA Quadro 600 with (1) DP and (1) DVI	(1) DP—DVI, (1) DVI-VGA
1.0GB AMD FirePro V4900 with (2) DP and (1) DVI	1) DP—DVI, (1) DVI-VGA
Professional 2D	
512MB NVIDIA NVS 300 with (1) DMS-59	(1) DMS-59—Dual DVI
512MB AMD FirePro 2270 with (1) DMS-59	(1) DMS-59—Dual DVI
Multi Core Compute (GPGPU)	
6GB NVIDIA Tesla C2075	Computing GPGPU - no I/O

DRIVES AND REMOVABLE STORAGE

Bays:	
5.25-inch Optical Bay Supported (External)	1
Slimline Optical Bay Supported (External)	1
Optical Drives Supported (maximum)	2
3.5" Hard Drive Bays Supported (Internal)	4
Hard Drives Supported 3.5"/2.5" (maximum)	4/8
Interface:	
SATA 3.0 (AHCI)	2
3.5" Hard Drives:	
3TB[1] SATA 7200 RPM HDD	X
2TB[1] SATA 7200 RPM HDD	X
1TB[1] SATA 7200 RPM HDD	X
500GB[1] SATA 7200 RPM HDD	X
250GB[1] SATA 7200 RPM HDD	X
2.5" Hard Drives:	
256GB[1] SATA Solid State Drive	X
900GB[1] SAS 10k RPM HDD	X
600GB[1] SAS 10k RPM HDD	X
146GB[1] SAS 15k RPM HDD	X
500GB[1] SATA 7200 RPM HDD	X
320GB[1] SATA 7200 RPM HDD	X

[1] For hard drives, GB means 1 billion bytes; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVE CONTROLLER

Dell PERC H310 for Dell Precision SATA/SAS 6Gb/s, host based RAID 0/1/5/10 (8 ports max)	Base
Dell PERC H710P for Dell Precision SATA/SAS 6Gb/s, hardware based RAID 0/1/5/10 (8 ports max)	Optional

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DRIVES AND REMOVABLE STORAGE (CON'T)

Optical Drive:	
Slimline Blu-ray Writer SATA 1.5Gbit/s	X
Slimline DVD+/-RW[1] SATA 1.5Gbit/s	X
Slimline DVD-ROM[1] SATA 1.5Gbit/s	X
5.25" DVD+/-RW[1] SATA 1.5Gbit/s	X
Media Card Reader:	
Dell 19 in 1 Media Card Reader	X

[1] Discs burned with this drive may not be compatible with some existing drives and players; using DVD+R media provides maximum compatibility.
[2] DVD-ROM drives may have write-capable hardware that has been disabled via firmware modifications.
NOTE: Dell 19 in 1 Media Card Reader (MCR) is supported via a F5 to F3 bay converter in the 5.25" Optical Drive Bay

SYSTEM EXPANSION SLOTS

NOTE: See Detailed Engineering Specifications for supported voltage, maximum wattage and card dimensions.

PCIe x16 Slot Gen 3	2 (4 with optional 2nd CPU installed)
PCIe x8 (wired x4) Slot Gen 3	1
PCIe x4 Slot Gen 2	1
PCI 32/33 Slot	1
Serial ATA (SATA) connectors	10 (8 HDD, 2 optical) (5-8 HDDs requires option choice at time of purchase)

EXTERNAL PORTS/CONNECTORS

USB 3.0	1 Front, 1 Rear
USB 2.0	3 Front, 5 Rear
Serial	1 Rear
Network Connector (RJ-45)	2 Rear
PS/2	2 Rear
1394 Controller via optional PCI card	Optional FH card
Audio:	
Line in for microphone	1 Front
Line in for microphone or stereo	1 Rear
Line out for headphones or speakers	1 Front, 1 Rear

COMMUNICATIONS - INTEGRATED LAN

INTEGRATED INTEL® 82579 GIGABIT[1] ETHERNET LAN 10/100/1000 **INTEGRATED INTEL® 82574 GIGABIT[1] ETHERNET LAN 10/100/1000 (CONT)**	
Support	
Operating System Driver Support	Windows 7 32/64, Vista 32/64 Red Hat Linux 6
Manageability (examples WOL, PXE)	WOL, PXE 2.1
Management Capabilities Alerting	Intel® Standard Manageability, Intel Xeon Processor with vPro Technology

[1] This term does not connote an actual operating speed of 1 Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

COMMUNICATIONS – OPTIONAL ADD-IN NETWORK CARD

Intel(R) Ethernet Server Adapter X520-T2	
Connector Type	2X RJ45
Data Rates supported	10/100/1000/10000[1] Mbps Half/Full duplex
Controller Details	
Controller bus architecture (example PCIe 1.0a x1)	PCIe Gen 2 X8
Data transfer mode (example Bus-Master DMA)	Bus-Master DMA
Power consumption (full operation per data rate connection speed)	25W maximum
Power consumption (standby operation)	Less than 300mW
IEEE standards compliance (example 802.1P)	802.1p, 802.1q, 802.2, 802.3, 802.3ad
Hardware Certifications (example FCC, B, GS mark…)	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC
Boot ROM Support	No
Network Transfer Mode	
Network Transfer Rate (example 10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps	1000BASE-T (full-duplex) 2000 Mbps Max 10GBASE-T (full-duplex) 20000 Mbps Max
Support	
Operating System Driver Support	Windows® 7 32- & 64-bit, Windows Vista® 32– and 64-bit
Manageability (examples WOL, PXE)	WOL, ACPI
Management Capabilities Alerting (example ASF 2.0)	None

[1] This term does not connote an actual operating speed of 10 Gb/sec. For high speed transmission, connection to a 10 Gigabit Ethernet server and network infrastructure is required.

AUDIO AND SPEAKERS

Realtek ALC269Q High Definition Audio Codec	Integrated on system board
Internal Chassis Speaker	Optional
Dell AY410 2.1 Desktop Speakers	Optional
Dell AX210 2.0 Desktop Speakers	Optional
Dell AX510/AX510PA Flat Panel Soundbar Speakers	Optional

KEYBOARD AND MOUSE

Dell USB Entry Keyboard	Optional
Dell Multimedia Pro Keyboard	Optional
Dell Smartcard Keyboard	Optional
Dell USB Optical Mouse	Optional
Dell Laser Mouse	Optional

SECURITY

Trusted Platform Module (TPM) 1.2[1]	Integrated on system board
Chassis Intrusion Switch	Optional
Dell Smartcard Keyboard	Optional
Chassis lock slot and loop support	Standard
Dell Data Protection | Encryption Accelerator Card	Optional

SERVICE AND SUPPORT

NOTE: For more details on Dell Service Plans please to go to: www.dell.com/service/service_plans

3 Year Warranty[1] Next Business Day On-site[2] (3-3-3)	Standard
ProSupport	Optional

SOFTWARE

Dell Client Manager	Available via Dell.com
Dell Data Protection/Access (DDPA)	Standard
Dell Data Protection | Encryption (DDPE)	Optional

DETAILED ENGINEERING SPECIFICATIONS

SYSTEM DIMENSIONS (PHYSICAL)

" NOTE: System Weight and Shipping Weight is based on a typical configuration and may vary based on PC configuration. A typical configuration includes: one graphics card, one hard drive, one optical drive"

Chassis Volume (liters)	48.82 l
Chassis Weight (pounds/kilograms)	54.28 lbs / 24.62 kg
Chassis Dimensions: (HxWxD)	
Height (inches/centimeters)	16.95 in / 43.05 cm
Width (inches/centimeters)	8.50 in / 21.60 cm
Depth (inches/centimeters)	20.67 in / 52.50 cm
Shipping Weight (pounds/kilograms - includes packaging materials)	66.54 lbs / 30.18 kg
Packaging Parameters (HxWxD)	
Height (inches/centimeters)	17.13 in / 43.51 cm
Width (inches/centimeters)	26.44 in / 67.16 cm
Depth (inches/centimeters)	21.94 in / 55.73 cm

SYSTEM EXPANSION SLOTS

Slot	Type	Voltage supported	Max Height (in,cm)	Max Length (in, cm)	Max Wattage	Cards Supported	Notes
1	PCIe x16 (x4)	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	25		
2	PCIe x16	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	300*		Default for factory installed graphics card
3	PCIe x16 (x4)	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	25		
4	PCIe x 16	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	300*		PERC controller, Second graphics card
5	PCI	3.3V / 5V / 12V / -12V	Standard Height 4.20in / 10.67cm	Full Length 12.28in / 31.20cm	25		
6	Mechanical Slot	n/a					
2-1	PCIe x16	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	225*		Only available when optional 2nd CPU is present
2-2	PCIe x16	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	225*		Only available when optional 2nd CPU is present

*Total allowed graphics power allowed in 3 x16 slots is 225W. Total graphics power allowed in system is 600W.
Both require optional 2nd CPU to be installed. Slot 4 and Slot 2 is defaults for PERC controller.

SYSTEM LEVEL ENVIRONMENTAL AND OPERATING CONDITIONS

Temperature	
Operating	10° to 35° C (50° to 95° F)
Non-Operating (Storage)	-40° to 60° C (-40° to 140° F)
Relative Humidity	20% to 80% (non-condensing)
Maximum vibration	
Operating	5 to 350 Hz at 0.0002 G^2/Hz
Non-Operating	5 to 500 Hz at 0.001 to 0.01 G^2/Hz
Maximum Shock	
Operating	40 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 51 cm/sec [20 in/sec])
Non-Operating	105 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 127 cm/sec [50 in/sec])
Maximum Altitude	
Operating	−15.2 to 3048 m (−50 to 10,000 ft)
Non-Operating	−15.2 to 10,668 m (−50 to 35,000 ft)

POWER

NOTE: The T7600 utilizes an Active Power Factor Correction (APFC) power supply to enhance efficiency. Dell recommends only Universal Power Supplies (UPS) based on Sine Wave output for APFC power supplies, not an approximation of a Sine Wave, Square Wave, or quasi-Square

	Specifications
Power Supply Wattage	1300W (for AC input voltages of 181—240 Vac) 1100W (for AC input voltages of 108—180 Vac) 1000W (for AC input voltages of 100—107 Vac)
AC input Voltage Range	100 - 240 Vac
AC input current (low ac range/high AC range)	14.0 A / 7.0 A
AC input Frequency	47 Hz / 63Hz
AC holdup time (80% load)	16 MSEC
Average Efficiency (Energy Star 5.2 Compliant)	87 – 90 – 87% @ 20 – 50 – 100% load
DC parameters	
+12.0v output	12VABCDEFGHIJ ; 18.0A
+5.0v auxiliary output	4.0A
-12.0v output	0.5A
Max total power	1300W
BTUs/h (based on PSU max wattage)	4113.0 BTU
Power Supply Fan	60*25mm (x2)
Compliance:	
1watt requirement	Yes
Climate Savers / 80Plus Compliant	Yes
FEMP (CECP) Standby Power Compliant	Yes

POWER CONTINUED

3.0v CMOS battery (Type and estimated battery life)				
Brand	Type	Voltage	Composition	Life
PANASONIC	CR-2302L/BE	3V	Lithium	Continuous Discharge Under 15 kΩ Load to 2.5V End-Voltage: 1100 hours or longer
MITSUBISHI	CR2302	3V	Lithium Manganese Dioxide	Continuous Discharge Under 15 kΩ Load to 2.5V End-Voltage: 1000 hours or longer

AUDIO

INTEGRATED REALTEK ALC269 HIGH DEFINITION AUDIO	
High Definition Stereo support	X
Number of channels	2
Number of Bits / Audio resolution	16, 20, and 24-bit resolution
Sampling rate (recording/playback)	Support 44.1K/48K/96K/192 kHz sample rates
Signal to Noise Ratio	98 dB DAC outputs, 90 dB for ADC inputs
Analog Audio	X
Dolby Digital	
THX	
Digital out (S/PDIF)	
Audio Jack Impedance	
Microphone	32K ohms
Line-In	32K ohms
Line-Out	200 ohms
Headphone	1 ohm
Internal Speaker Power Rating	2.3 Watts (max) / 2.0 Watts (typ)

COMMUNICATIONS - INTEGRATED LAN

INTEGRATED INTEL® 82579 GIGABIT[1] ETHERNET LAN 10/100/1000	
External Connector Type	RJ45
Data Rates supported	10/100/1000[1] Mbps
Controller Details	
Controller bus architecture	Intel direct-connect
Integrated memory	N/A
Data transfer mode (example Bus-Master DMA)	N/A
Power consumption (full operation per data rate connection speed)	711mW (Max.)
Power consumption (standby operation)	227mW (Max.)
IEEE standards compliance (example 802.1P)	802.3
Hardware Certifications (example FCC, B, GS mark...)	N/A
Boot ROM Support	EEPROM (located in SPI)
Network Transfer Mode (example Full Duplex, Half Duplex)	
Network Transfer Rate (example 10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps	10 Mb (full/half-duplex) 100 Mb (full/half-duplex) 1000[1] Mb (full-duplex)

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COMMUNICATIONS - INTEGRATED LAN (CONT.)

INTEGRATED INTEL® 82579 GIGABIT ETHERNET LAN 10/100/1000 (CONT.)	
Support	
Operating System Driver Support	Windows 7 32/64, Vista 32/64 Red Hat Linux 6
Manageability (examples WOL, PXE)	WOL, PXE 2.1
Management Capabilities Alerting	Intel® Standard Manageability, Intel Xeon Processor with vPro Technology

[1] This term does not connote an actual operating speed of 1 Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

COMMUNICATIONS – OPTIONAL ADD-IN NETWORK INRERFACE CARD (NIC)

Intel(R) X520-T2 Ethernet 10GbE[1] Server Adapter	
Connector Type	2X RJ45
Data Rates supported	10/100/1000/10000[1] Mbps Half/Full duplex
Controller Details	
Controller bus architecture (example PCIe 1.0a x1)	PCIe Gen 2 X8
Data transfer mode (example Bus-Master DMA)	Bus-Master DMA
Power consumption (full operation per data rate connection speed)	25W maximum
Power consumption (standby operation)	Less than 300mW
IEEE standards compliance (example 802.1P)	802.1p, 802.1q, 802.2, 802.3, 802.3ad
Hardware Certifications (example FCC, B, GS mark...)	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC
Boot ROM Support	No
Network Transfer Mode	
Network Transfer Rate (example 10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps	1000BASE-T (full-duplex) 2000 Mbps Max 10GBASE-T (full-duplex) 20000 Mbps Max
Support	
Operating System Driver Support	Windows® 7 32- & 64-bit, Windows Vista® 32– and 64-bit
Manageability (examples WOL, PXE)	WOL, ACPI
Management Capabilities Alerting (example ASF 2.0)	None

COMMUNICATIONS – OPTIONAL 1394 NETWORK CARD

1394 NETWORK ADD-IN CARD	
Connector Type	PCI 2.3
Controller Details	
Controller bus architecture (example PCIe 1.0a x1)	PCI 2.3
IO Ports	2 External 1394a 6-pin connectors 1 Internal 1394a 10-pin header
Power Consumption	Under 30 mA
Connector	1394a
OS Support	Windows® 7 32- & 64-bit, Windows Vista® 32– and 64-bit

GRAPHICS/VIDEO CONTROLLER

NVIDIA NVS 300	
Bus Type (example integrated or PCIe x16)	PCIEx16
GPU core clock	520 MHz
Frame Buffer Memory (onboard and shared) Size and Speed	512MB DDR3 @ 790 MHz
Maximum power consumption	17.5W
Maximum Color Depth	24 bit RGB (True Color)
Maximum Vertical Refresh Rate	85Hz analog, 60Hz digital
Multiple Display Support	2
Operating Systems Graphics/ Video API Support	Microsoft Windows 7, Vista, XP all with 32bit and 64Bit. Redhat Linux, Open GL 4.1, DirectX 11
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	DisplayPort Max 2 digital displays at up to 2560 X 1600 @60Hz, Single−link DVI Max: 2 digital displays up to 1920 x 1200 @ 60Hz: VGA Max 2 analog displays up to : 2048 x 1536 @ 85Hz
External connectors	DMS59
DisplayPort Audio Support	Yes
Dimensions of full height card inches/centimeters	Low Profile 2.7" H x 5.7" L Single Slot 68mm H x 145mm L
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0 °C to 55 °C
Relative Humidity Range	5% to 90% RH
Altitude Range	Not specified

GRAPHICS/VIDEO CONTROLLER (CONT.)

NVIDIA QUADRO 600	
Bus Type (example integrated or PCIe x16)	PCIEx16
GPU core clock	640 MHz
Frame Buffer Memory (onboard and shared) Size and Speed	1 GB DDR3 @ 800 MHz
Maximum power consumption	40W
Maximum Color Depth	30Bit
Maximum Vertical Refresh Rate	85Hz analog, 120Hz digital
Multiple Display Support	2
Operating Systems Graphics/ Video API Support	Microsoft Windows 7, Vista, XP all with 32bit and 64Bit. Redhat Linux, Open GL 4.1, DirectX 11
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	DisplayPort Max 2 digital displays at up to 2560 X 1600 @60Hz, or 1920 X 1200 @120HZ. Dual-link DVI Max: 2 digital displays up to 2560 X 1600 @60HX, or 1920 x 1200 @ 120Hz: VGA Max 2 an-alog displays up to : 2048 x 1536 @ 85Hz
External connectors	1 Dual-link DVI, 1 DisplayPort
DisplayPort Audio Support	Yes
Dimensions of full height card inches/centimeters	2.731" H x 6.6" L Singe slot 69mm H x 168mm L
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0 °C to 55 °C
Relative Humidity Range	5% to 90% RH
Altitude Range	Not specified

GRAPHICS/VIDEO CONTROLLER (CONT.)

NVIDIA QUADRO 2000	
Bus Type (example integrated or PCIe x16)	PCIEx16
GPU core clock	625 MHz
Frame Buffer Memory (onboard and shared) Size and Speed	1024 MB GDDR5 @1300 MHz
Maximum power consumption	62W
Maximum Color Depth	30Bit
Maximum Vertical Refresh Rate	85Hz analog, 120Hz digital
Multiple Display Support	2
Operating Systems Graphics/ Video API Support	Microsoft Windows 7, Vista, XP all with 32bit and 64Bit support. Red Hat Enterprise Linux, Open GL 4.1, DirectX 11
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	DisplayPort Max 2 digital displays at up to 2560 X 1600 @60Hz, or 1920 X 1200 @120HZ. Dual-link DVI Max: 2 digital displays up to 2560 X 1600 @60HX, or 1920 x 1200 @ 120Hz: VGA Max 2 analog displays up to : 2048 x 1536 @ 85Hz
External connectors	1 Dual-link DVI, 2 DisplayPort
DisplayPort Audio Support	Yes
Dimensions of full height card inches/centimeters	4.376" H x 7" L, Single slot 110mm H x 177.8mm L
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0 °C to 55 °C
Relative Humidity Range	5% to 90% RH
Altitude Range	Not specified

GRAPHICS/VIDEO CONTROLLER (CONT.)

NVIDIA QUADRO 4000	
Bus Type (example integrated or PCIe x16)	PCIEx16
GPU core clock	475 MHz
Frame Buffer Memory (onboard and shared) Size and Speed	2 GB GDDR5 @ 1400 MHz
Maximum power consumption	142 watts
Maximum Color Depth	30Bit
Maximum Vertical Refresh Rate	85Hz analog, 120Hz digital
Multiple Display Support	2
Operating Systems Graphics/ Video API Support	Microsoft Windows 7, Vista, XP all with 32bit and 64Bit support. Red Hat Enterprise Linux, Open GL 4.1, DirectX 11
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	DisplayPort Max 2 digital displays at up to 2560 X 1600 @60Hz, or 1920 X 1200 @120HZ. Dual-link DVI Max: 2 digital displays up to 2560 X 1600 @60HX, or 1920 x 1200 @ 120Hz: VGA Max 2 analog displays up to : 2048 x 1536 @ 85Hz
External connectors	1 Dual-link DVI, 2 DisplayPort
DisplayPort Audio Support	Yes
NVIDIA SLI Technology Support	Yes
Dimensions of full height card inches/centimeters	4.376" H x 9.50" L Single slot 110mm H x 240mm L
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0 °C to 55 °C
Relative Humidity Range	5% to 90% RH
Altitude Range	Not specified

GRAPHICS/VIDEO CONTROLLER (CONT.)

NVIDIA QUADRO 5000	
Bus Type (example integrated or PCIe x16)	PCIEx16
GPU core clock	510 MHz
Frame Buffer Memory (onboard and shared) Size and Speed	2.5 GB GDDR5 @ 1500 MHz
Maximum power consumption	152 watts
Maximum Color Depth	30Bit
Maximum Vertical Refresh Rate	85Hz analog, 120Hz digital
Multiple Display Support	2
Operating Systems Graphics/ Video API Support	Microsoft Windows 7, Vista, XP all with 32bit and 64Bit support. Red Hat Enterprise Linux, Open GL 4.1, DirectX 11
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	DisplayPort Max 2 digital displays at up to 2560 X 1600 @60Hz, or 1920 X 1200 @120HZ. Dual-link DVI Max: 2 digital displays up to 2560 X 1600 @60HX, or 1920 x 1200 @ 120Hz: VGA Max 2 analog displays up to : 2048 x 1536 @ 85Hz
External connectors	1 Dual-link DVI, 2 DisplayPort Stereo 3D connector - 3-pin mini DIN 3D Vision Pro Support—3 pin mini DIN or USB
DisplayPort Audio Support	Yes
NVIDIA SLI Technology Support	Yes
Dimensions of full height card inches/centimeters	4.376" H x 9.50" L Single slot 110mm H x 240mm L
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0 °C to 55 °C
Relative Humidity Range	5% to 90% RH
Altitude Range	Not specified

GRAPHICS/VIDEO CONTROLLER (CONT.)

NVIDIA QUADRO 6000	
Bus Type (example integrated or PCIe x16)	PCIEx16
GPU core clock	575 MHz
Frame Buffer Memory (onboard and shared) Size and Speed	6 GB GDDR5 @ 1500 MHz
Maximum power consumption	225 watts
Maximum Color Depth	30Bit
Maximum Vertical Refresh Rate	85Hz analog, 120Hz digital
Multiple Display Support	2
Operating Systems Graphics/ Video API Support	Microsoft Windows 7, Vista, XP all with 32bit and 64Bit support. Red Hat Enterprise Linux, Open GL 4.1, DirectX 11
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	DisplayPort Max 2 digital displays at up to 2560 X 1600 @60Hz, or 1920 X 1200 @120HZ. Dual-link DVI Max: 2 digital displays up to 2560 X 1600 @60HX, or 1920 x 1200 @ 120Hz: VGA Max 2 an-alog displays up to : 2048 x 1536 @ 85Hz
External connectors	1 Dual-link DVI, 2 DisplayPort Stereo 3D connector - 3-pin mini DIN 3D Vision Pro Support—3 pin mini DIN or USB
DisplayPort Audio Support	Yes
NVIDIA SLI Technology Support	Yes[1]
Dimensions of full height card inches/centimeters	4.376" H x 9.75" L Dual slot 110mm H x 240mm L
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0 °C to 45 °C
Relative Humidity Range	5% to 90% RH
Altitude Range	Not specified

GRAPHICS/VIDEO/COMPUTING CONTROLLER

NVIDIA® TESLA™ C2075 COMPANION PROCESSOR	
Bus Type (example integrated or PCIe x16)	PCIEx16
GPU core clock	448 Cuda cores @ 1.15GHz
Frame Buffer Memory (onboard and shared) Size and Speed	6.0GB GDDR5
Maximum power consumption	225 watts
Maximum Color Depth	30Bit
Maximum Vertical Refresh Rate	85Hz analog, 120Hz digital
Multiple Display Support	2
Operating Systems Graphics/ Video API Support	Linux 32-bit and 64-bit - Windows XP, Windows Vista, Windows 7 (32-bit and 64-bit)
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	Linux 32-bit and 64-bit - Windows XP, Windows Vista, Windows 7 (32-bit and 64-bit)
CUDA PROGRAMMING ENVIRONMENT WITH BROAD SUPPORT OF PROGRAMMING LANGUAGES AND APIs	C, C++, OpenCL, DirectCompute, or Fortran to express application parallelism and take advantage of the "Fermi" GPU's innovative architecture. NVIDIA Parallel Nsight GPU debugging tool is available for Microsoft Visual Studio developers.
External connectors	None
Dimensions of full height card	4.376" H x 9.75" L Dual slot 110mm H X 240mm L
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0 °C to 55 °C
Relative Humidity Range	5% to 90% RH
Altitude Range	Not specified

GRAPHICS/VIDEO CONTROLLER (CONT.) - AMD

AMD FIREPRO V2270	
Bus Type (example integrated or PCIe x16)	PCIEx16
GPU core clock	600MHz
Frame Buffer Memory (onboard and shared) Size and Speed	512MB(or 1GB) 600MHz
Maximum power consumption	17W
Maximum Color Depth	32bpp
Maximum Vertical Refresh Rate	120Hz
Multiple Display Support	2
Operating Systems Graphics/ Video API Support	WinXP, Win7, Linux, DX11 OGL4.1
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	1920x1200 60hz analog 2560x1600 60hz
External connectors	DMS59 connector, Two DVI to VGA adapters
DisplayPort Audio Support	NA
Dimensions of full height card inches/centimeters	Low Profile, Half Length
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0 °C to 55 °C
Relative Humidity Range	5% to 90% RH
Altitude Range	Not specified

GRAPHICS/VIDEO CONTROLLER (CONT.) - AMD

AMD FIREPRO V4900	
Bus Type (example integrated or PCIe x16)	PCIEx16
GPU core clock	800 MHz
Frame Buffer Memory (onboard and shared) Size and Speed	1 GB GDDR5 @ 1000 MHz
Maximum power consumption	<75W
Maximum Color Depth	32 bpp
Maximum Vertical Refresh Rate	120 Hz
Multiple Display Support	Up to 6 with DisplayPort 1.2 Multi-streaming Up to 3 without DisplayPort 1.2 multi-streaming
Operating Systems Graphics/ Video API Support	Windows Vista, Windows 7, DX 11, OpenGL 4.2
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	Dual-Link DVI Max: 2560 x 1600/32bpp @ 60Hz DispalyPort Max: 2560 x 1600/32bpp @ 60Hz VGA Max : 1920x1440/32bpp @ 75Hz
External connectors	2 DP, 1 DL DVI, One DisplayPort to DVI (single link passive) adapter
DisplayPort Audio Support	Yes
Dimensions of full height card inches/centimeters	Full Height/Half length
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0 °C to 55 °C
Relative Humidity Range	5% to 90% RH
Altitude Range	Not specified

GRAPHICS/VIDEO CONTROLLER (CONT.) - AMD

AMD FIREPRO V5900	
Bus Type (example integrated or PCIe x16)	PCIEx16
GPU core clock	600 MHz
Frame Buffer Memory (onboard and shared) Size and Speed	2 GB GDDR5 @ 500 MHz
Maximum power consumption	<75W
Maximum Color Depth	32bpp
Maximum Vertical Refresh Rate	120 Hz
Multiple Display Support	Up to 6 with DisplayPort 1.2 Multi-streaming Up to 3 without DisplayPort 1.2 multi-streaming
Operating Systems Graphics/ Video API Support	Windows Vista, Windows 7, DX 11, OpenGL 4.2
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	Dual-Link DVI Max: 2560 x 1600/32bpp @ 60Hz Dispaly Port Max: 2560 x 1600/32bpp @ 60Hz VGA Max : 1920x1440/32bpp @ 75Hz
External connectors	2 DP, 1 DL DVI, One DisplayPort to DVI (single link active) adapter
DisplayPort Audio Support	Yes
Dimensions of full height card inches/centimeters	Full height/Full length
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0 °C to 55 °C
Relative Humidity Range	5% to 90% RH
Altitude Range	Not specified

GRAPHICS/VIDEO CONTROLLER (CONT.) - AMD

AMD FIREPRO V7900	
Bus Type (example integrated or PCIe x16)	PCIEx16
GPU core clock	725 MHz
Frame Buffer Memory (onboard and shared) Size and Speed	2GB GDDR5 @ 1250 MHz
Maximum power consumption	<150 W
Maximum Color Depth	32bit
Maximum Vertical Refresh Rate	120Hz
Multiple Display Support	Up to 6 with DisplayPort 1.2 Multi-streaming Up to 3 without DisplayPort 1.2 multi-streaming
Operating Systems Graphics/ Video API Support	Windows Vista, Windows 7, DX 11, OpenGL 4.2
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	Dual-Link DVI Max: 2560 x 1600/32bpp @ 60Hz DispalyPort Max: 2560 x 1600/32bpp @ 60Hz VGA Max : 1920x1440/32bpp @ 75Hz
External connectors	4 DP, 4 x DP to DVI (single link active) adapter
DisplayPort Audio Support	Yes
Dimensions of full height card inches/centimeters	Full height/Full length
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0 °C to 55 °C
Relative Humidity Range	5% to 90% RH
Altitude Range	Not specified

HARD DRIVES[1]

3.5" 3TB SATA 7200 RPM HDD	
Capacity (bytes)	3,000,592,982,016
Dimensions inches (W x D x H)	Approximately (4.00 x 5.787 x 1.028 inches)
Interface type and Maximum speed	SATA Up to 6Gb/s
Internal buffer size	32 MB
Average Seek Time	
Rotational Speed	7200 RPM
Logical Blocks	5,860,533,168
Power Source	
Power Consumption (reference only)	Idle 5.0W, Active 10.0W
Spin Up Current (reference only)	5V (1A) ,12V (2A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5°C to 60°C
Relative Humidity Range	20% to 80% non-condensing
Maximum Wet Bulb Temperature	29°C
Altitude Range	-50 ft to 10000 ft
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40°C to 65°C
Relative Humidity Range	10% to 90% non-condensing
Maximum Wet Bulb Temperature	38°C
Altitude Range	-50 ft to 35000 ft

[1] For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES[1]

3.5" 2TB SATA 7200 RPM HDD	
Capacity (bytes)	2,000,398,934,016
Dimensions inches (W x D x H)	Approximately (4.00 x 5.787 x 1.028 inches)
Interface type and Maximum speed	SATA Up to 6Gb/s
Internal buffer size	32 MB
Average Seek Time	
Rotational Speed	7200 RPM
Logical Blocks	3,907,029,168
Power Source	
Power Consumption (reference only)	Idle 5.0W, Active 10.0W
Spin Up Current (reference only)	5V (1A) ,12V (2A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5^0C to 60^0C
Relative Humidity Range	20% to 80% non-condensing
Maximum Wet Bulb Temperature	29^0C
Altitude Range	-50 ft to 10000 ft
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40^0C to 65^0C
Relative Humidity Range	10% to 90% non-condensing
Maximum Wet Bulb Temperature	38^0C
Altitude Range	-50 ft to 35000 ft

HARD DRIVES[1] (CONT)

3.5" 1TB SATA 7200 RPM HDD	
Capacity (bytes)	1,000,204,886,016
Dimensions inches (W x D x H)	Approximately (4.00 x 5.787 x 1.028 inches)
Interface type and Maximum speed	SATA Up to 6Gb/s
Internal buffer size	32 MB
Average Seek Time	
Rotational Speed	7200 RPM
Logical Blocks	1,953,525,168
Power Source	
Power Consumption (reference only)	Idle 5.0W, Active 10.0W
Spin Up Current (reference only)	5V (1A) ,12V (2A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5^0C to 60^0C
Relative Humidity Range	20% to 80% non-condensing
Maximum Wet Bulb Temperature	29^0C
Altitude Range	-50 ft to 10000 ft
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40^0C to 65^0C
Relative Humidity Range	10% to 90% non-condensing
Maximum Wet Bulb Temperature	38^0C
Altitude Range	-50 ft to 35000 ft

[1] For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES[1] (CONT.)

3.5" 500GB SATA 7200 RPM HDD	
Capacity (bytes)	500,107,862,016
Dimensions inches (W x D x H)	Approximately (4.00 x 5.787 x 1.028 inches)
Interface type and Maximum speed	SATA Up to 6Gb/s
Internal buffer size	16 MB
Average Seek Time	
Rotational Speed	7200 RPM
Logical Blocks	976,773,168
Power Source	
Power Consumption (reference only)	Idle 5.0W, Active 10.0W
Spin Up Current (reference only)	5V (1A) ,12V (2A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5°C to 60°C
Relative Humidity Range	20% to 80% non-condensing
Maximum Wet Bulb Temperature	29°C
Altitude Range	-50 ft to 10000 ft
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40^{0}C to 65^{0}C
Relative Humidity Range	10% to 90% non-condensing
Maximum Wet Bulb Temperature	38^{0}C
Altitude Range	-50 ft to 35000 ft

[1] For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES[1] (CONT.)

3.5" 250GB SATA 7200 RPM HDD	
Capacity (bytes)	250,059,350,016
Dimensions inches (W x D x H)	Approximately (4.00 x 5.787 x 1.028 inches)
Interface type and Maximum speed	SATA Up to 6Gb/s
Internal buffer size	8 MB
Average Seek Time	
Rotational Speed	7200 RPM
Logical Blocks	488,397,168
Power Source	
Power Consumption (reference only)	Idle 5.0W, Active 10.0W
Spin Up Current (reference only)	5V (1A) ,12V (2A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5^0C to 60^0C
Relative Humidity Range	20% to 80% non-condensing
Maximum Wet Bulb Temperature	29^0C
Altitude Range	-50 ft to 10000 ft
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40^0C to 65^0C
Relative Humidity Range	10% to 90% non-condensing
Maximum Wet Bulb Temperature	38^0C
Altitude Range	-50 ft to 35000 ft

[1] For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES[1] (CONT.)

2.5" 256GB SOLID STATE DRIVE (SSD)	
Capacity (bytes)	512GB / 256GB
Dimensions inches (W x D x H)	Approximately (2.75 x 3.94 x 0.276 inches)
Interface type and Maximum speed	SATA Up to 6Gb/s
Internal buffer size	256 MB
MTBF	1M Hours
Logical Blocks	1,000,215,216 / **500,118,192**
Power Source	
Power Consumption (reference only)	Idle 0.50W, Active 2.5W
Spin Up Current (reference only)	NA
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	0°C to 70°C
Relative Humidity Range	10% to 90% non-condensing
Maximum Wet Bulb Temperature	29°C
Altitude Range	Exceeds Platform range
Op Shock (@0.5ms)	1,500G
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40°C to 70°C
Relative Humidity Range	5% to 95% non-condensing
Maximum Wet Bulb Temperature	38°C
Altitude Range	Exceeds Platform range

[1] For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES[1] (CONT.)

2.5" 900GB SAS 10K RPM HDD	
Capacity (bytes)	900GB
Dimensions inches (W x D x H)	Approximately (2.75 x 3.94 x 0.374 inches)
Interface type and Maximum speed	SAS Up to 6Gb/s
Internal buffer size	16MB Minimum
Rotational Speed	10,000 RPM
Logical Blocks	1,758,174,768
Power Source	
Power Consumption (reference only)	Active 9.0W
Spin Up Current (reference only)	Not Specified
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	Exceeds Platform range
Relative Humidity Range	Exceeds Platform range
Maximum Wet Bulb Temperature	Exceeds Platform range
Altitude Range	Exceeds Platform range
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	Exceeds Platform range
Relative Humidity Range	Exceeds Platform range
Maximum Wet Bulb Temperature	Exceeds Platform range
Altitude Range	Exceeds Platform range

[1] For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES[1] (CONT.)

2.5" 600GB SAS 10K RPM HDD	
Capacity (bytes)	600GB
Dimensions inches (W x D x H)	Approximately (2.75 x 3.94 x 0.374 inches)
Interface type and Maximum speed	SAS Up to 6Gb/s
Internal buffer size	64MB Minimum
Rotational Speed	10,000 RPM
Logical Blocks	1,172,123,568
Power Source	
Power Consumption (reference only)	Active 9.0W
Spin Up Current (reference only)	Not Specified
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	Exceeds Platform range
Relative Humidity Range	Exceeds Platform range
Maximum Wet Bulb Temperature	Exceeds Platform range
Altitude Range	Exceeds Platform range
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	Exceeds Platform range
Relative Humidity Range	Exceeds Platform range
Maximum Wet Bulb Temperature	Exceeds Platform range
Altitude Range	Exceeds Platform range

[1] For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES[1] (CONT.)

2.5" 146GB SAS 15K RPM HDD	
Capacity (bytes)	146GB
Dimensions inches (W x D x H)	Approximately (2.75 x 3.94 x 0.374 inches)
Interface type and Maximum speed	SAS Up to 6Gb/s
Internal buffer size	16MB Minimum
Rotational Speed	15,000 RPM
Logical Blocks	286,749,480
Power Source	
Power Consumption (reference only)	Active 9.0W
Spin Up Current (reference only)	Not Specified
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	Exceeds Platform range
Relative Humidity Range	Exceeds Platform range
Maximum Wet Bulb Temperature	Exceeds Platform range
Altitude Range	Exceeds Platform range
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	Exceeds Platform range
Relative Humidity Range	Exceeds Platform range
Maximum Wet Bulb Temperature	Exceeds Platform range
Altitude Range	Exceeds Platform range

[1] For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES[1] (CONT.)

2.5" 500GB SATA 7200 RPM HDD	
Capacity (bytes)	500,107,862,016
Dimensions inches (W x D x H)	Approximately (2.75 x 3.94 x 0.374 inches)
Interface type and Maximum speed	SATA Up to 3Gb/s
Internal buffer size	16 MB
Average Seek Time	
Rotational Speed	7200 RPM
Logical Blocks	976,773,168
Power Source	
Power Consumption (reference only)	Idle 0.70W, Active 3.25W
Spin Up Current (reference only)	5V (1000 mA)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5°C to 60°C
Relative Humidity Range	20% to 80% non-condensing
Maximum Wet Bulb Temperature	29°C
Altitude Range	-50 ft to 10000 ft
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40°C to 65°C
Relative Humidity Range	10% to 90% non-condensing
Maximum Wet Bulb Temperature	38°C
Altitude Range	-50 ft to 35000 ft

[1] For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

OPTICAL DRIVES

	8x Slimline DVD-ROM	8x Slimline DVD +/- R/W	6x Slimline BD-RE
External Dimensions inches/ centimeters (Without Bezel – W x H x D)	128.0 mm (5.04)/ 12.7mm (0.5 in)/ 126.1mm (4.97in)	128.0 mm (5.04)/ 12.7mm (0.5 in)/ 126.1mm (4.97in)	128.0 mm (5.04)/ 12.7mm (0.5 in)/ 126.1mm (4.97in)
Weight (max) pounds/kilograms	170g	170g	170g
Interface type and speed	SATA 1.5Gbit/s	SATA 1.5Gbit/s	SATA 1.5Gbit/s
Disc Capacity	Standard	Standard	Standard
Internal buffer size	supplier dependent	supplier dependent	supplier dependent
Access Times (typical)	supplier dependent	supplier dependent	supplier dependent
Maximum Data Transfer Rates			
Writes	NA	8x DVD/ 24x CD	6xBD/ 8x DVD/ 24x CD
Reads	8x DVD/ 24x CD	8x DVD/ 24x CD	6xBD/ 8x DVD/ 24x CD
Power Source			
DC Power Requirements	5V	5V	5V
DC Current	1000mA	1000mA	1000mA
Environmental Operating Conditions (Non-Condensing):			
Operating Temperature Range	5C to 50C	5C to 50C	5C to 50C
Relative Humidity Range	20% to 80% RH	20% to 80% RH	20% to 80% RH
Maximum Wet Bulb Temperature	29C	29C	29C
Altitude Range	-200 to 3048	-200 to 3048	-200 to 3048
Environmental Non-Operating Conditions (Non-Condensing):			
Operating Temperature Range	-40C to 65C	-40C to 65C	-40C to 65C
Relative Humidity Range	5% to 95% RH	5% to 95% RH	5% to 95% RH
Maximum Wet Bulb Temperature	38C	38C	38C
Altitude Range	-200 to 10600m	-200 to 10600m	-200 to 10600m

[1] Discs burned with this drive may not be compatible with some existing drives and players; using DVD+R media provides maximum compatibility.

OPTICAL DRIVES (CONTINUED)

	16x Half Height DVD +/- R/W
External Dimensions inches/ centimeters (Without Bezel – W x H x D)	148.2mm(6in)/42mm (2in)/ 171 (max)
Weight (max) pounds/kilograms	800g
Interface type and speed	SATA 1.5Gbit/s
Disc Capacity	Standard
Internal buffer size	supplier dependent
Access Times (typical)	supplier dependent
Maximum Data Transfer Rates	
Writes	16x DVD/48x CD
Reads	16x DVD/48x CD
Power Source	
DC Power Requirements	12V, 5V
DC Current	800mA (12V)/ 1100mA (5V)
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	5C to 50C
Relative Humidity Range	20% to 80% RH
Maximum Wet Bulb Temperature	29C
Altitude Range	-200 to 3048
Environmental Non-Operating Conditions (Non-Condensing):	
Operating Temperature Range	-40C to 65C
Relative Humidity Range	5% to 95% RH
Maximum Wet Bulb Temperature	38C
Altitude Range	-200 to 10600m

[1] Discs burned with this drive may not be compatible with some existing drives and players; using DVD+R media provides maximum compatibility.

MEDIA CARD READER (MCR)

NOTE: Dell 19 in 1 Media Card Reader (MCR) is supported via an optional bracket. The MCR is not available when a second op-tical drive is installed or when hard drives three and four are installed.

19 in 1 Media Card Reader	
External Dimensions inches/(centimeters) (With Bezel – W x H)	3.99/(10.13cm)/1.0/(2.54cm)
Weight (max) pounds/kilograms	~155g
Interface type and speed	USB 2.0, 480Mb/s
Media Supported (maximum capacity supported will vary by Flash Media Types)	
Media Supported	CF I CF II Micro Drive (MD) Secure Digital (SD) SDHC Mini Secure Digital (mini-SD) Micro Secure Digital (Micro-SD)(with adapter) Multi Media Card (MMC) RS Multi Media Card (RS-MMC) Multi Media Card plus (MMC plus) RS Multi Media Card plus (RS-MMC plus) Multi Media Card Micro(MMC Micro) (with adapter) Memory Stick (MS) Memory Stick Pro(MS Pro) Memory Stick Pro Duo (MS Pro Duo) Memory Stick Duo (MS-Duo) Memory Stick Micro(MS Micro)(M2) (with adapter) Smart Media (SM) xD
Support Specification Versions:	Compact Flash type I/II Version 4.0 Smart Media (SM) Specification 2003 Multi Media Card (MMC) Specification 4.2 Secure Digital (SD) 2.0 Memory Stick Pro (MS-PRO) Specification 1.02 Memory Stick (MS) Specification 1.43 xD Specification 1.2
Power Source	
Max Power Requirements	12V, 5V
Supply Voltage Range	4.75V ~ 5.25V
Power Consumption:	Standby less than 0.5mA @ 5.0VDC
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	5C to 50C
Relative Humidity Range	10% to 90% RH
Environmental Non-Operating Conditions (Non-Condensing):	
Operating Temperature Range	-40C to 65C
Relative Humidity Range	5% to 95% RH

BIOS DEFAULTS

System Configuration	Integrated NIC:	Enabled
	Integrated NIC 2:	Enabled
	USB Controller:	Enabled
	Serial Port:	COM1
	SATA Operation:	AHCI
	USB Configuration::	Enable Boot Support/Front USB Ports/ Rear USB Ports/USB3 Ports
	SMART Reporting:	Disabled
	PCI Bus Configuration:	64 PCI Buses
	Audio:	Enabled
	Drives:	Enabled (SATA0, SATA1)
	HDD Fans:	(depends on system configuration)

Performance	Multiple Core Support:	All
	Intel® SpeedStep™:	Enabled
	C States Control:	Enabled
	Intel TurboBoost	Enabled
	Non-Uniform Memory Access:	Enabled
	HyperThread control:	Enabled
	Cache Prefetch:	Enable Hardware Prefetch and Adjacent Cache Line Prefetch
	RMT:	Enabled

Virtualization Support	Virtualization:	Enabled
	VT for Direct I/O:	Disabled

Security	Intel TXT (LT-SX) Configuration:	Disabled
	Administrator Password:	Not set
	System Password:	Not set
	Strong Password:	Disabled
	Password Configuration:	Min=4, Max=32
	Password Bypass:	Disabled
	Password Changes:	Enabled
	TPM Security:	Disabled
	CPU XD Support:	Enabled
	Computrace®:	Deactivated
	Chassis Intrusion:	Disabled
	Admin Setup Lockout:	Disabled

Power Management	AC Recovery:	Power Off
	Auto On Time:	Disabled
	Deep Sleep Control:	Disabled
	Fan Speed Control:	Auto
	Wake on LAN:	Disabled

BIOS DEFAULTS (CONTINUED)

Maintenance	Service Tag:	Set by the factory
	Asset Tag:	Optional User Entry
	SERR Message:	Enabled
	Numlock LED:	Enabled
	Keyboard Errors:	Enabled
	POST HotKeys:	Enabled

CHASSIS ENCLOSURE & VENTILATION REQUIREMENTS

ENCLOSURE VENTILATION

If your enclosure has doors, they need to be of a type that allows at least 30% airflow through the enclosure (front and back).

ENCLOSURE MINIMUM CLEARANCE

Leave a 10.2 cm (4 in.) minimum clearance on all vented sides of the computer to permit the airflow required for proper ventilation.

Enclosure Door Area

The intake and exhaust door areas should be at a minimum, the same size as the system intake and exhaust areas

RECOMMENDED ENCLOSURE

Do not install your computer in an enclosure that does not allow airflow. This restricts the airflow and impacts your computer's performance, possibly causing it to overheat.

OPEN DESK MINIMUM CLEARANCE

If your computer is installed in a corner, on a desk, or under a desk, leave at least 5.1 cm (2 in.) clearance from the back of the computer to the wall to permit the airflow required for proper ventilation.

REGULATORY COMPLIANCE AND ENVIRONMENTAL

Product related conformity assessment and regulatory authorizations including Product Safety, Electromagnetic Compatibility (EMC), Ergonomics, and Communication Devices relevant to this product may be viewed at www.dell.com/regulatory_compliance. The Regulatory Datasheet for this product is located at http://www.dell.com/regulatory_compliance.

Details of Dell's environmental stewardship program to conserve product energy consumption, reduce or eliminate materials for disposal, prolong product life span and provide effective and convenient equipment recovery solutions may be viewed at www.dell.com/environment.   Product related conformity assessment, regulatory authorizations, and information encompassing Environmental, Energy Consumption, Noise Emissions, Product Materials Information, Packaging, Batteries, and Recycling relevant to this product may be viewed by clicking the Design for Environment link on the webpage.

Dell Inc.
One Dell Way
Round Rock, Texas 78682
www.dell.com

November 23, 2011

Subject: Statement of Volatility – Dell Precision Workstation T7600

Gentlemen:

The Dell Precision Workstation T7600 contains both volatile and non-volatile (NV) components. Volatile components lose their data immediately upon removal of power from the component. Non-volatile components continue to retain their data even after the power has been removed from the component.

The following memory components are present in the T7600:

BIOS Configuration
The BIOS information is stored in two flash ICs, one 8 MByte and one 4 MByte. These devices are identified as U_BIOS1 and U_BIOS2 on the motherboard. These parts contain the boot code and data necessary to take the hardware from a power-off or low-power state to a state where it is ready to be managed by the operating system. No information pertaining to user applications or data is stored in these devices, however, they do store administrator and/or hard drive encryption passwords if those features are enabled by the user.

Embedded Controller
The Embedded Controller contains 256 kByte of non-volatile storage space and is identified as U_EC1 on the motherboard. The EC contains the software necessary to manage low-level control functions on the motherboard such as thermal control. No information pertaining to user applications or data is stored in the U_EC1 device.

The embedded controller also contains 8.25 kBytes of volatile memory space. The contents of this memory space are lost when power is removed from the system.

PCH CMOS
The PCH, identified as U_PCH, contains a 256 Byte battery-backed memory. This memory contains custom configuration data required by the BIOS to boot the system. It does not store passwords or other user level data. The contents of this space are lost, after several minutes, if the coin-cell battery is removed from the motherboard.

Ethernet Controller EEPROMs
The Ethernet Controller EEPROM is identified as U35 on the motherboard. It is a 2 kbit device. The Ethernet Controller EEPROM stores driver information and the system MAC addresses. It does not store password, IP address, domain name, system ID, or similar information.

temperatures) the DDR3 DIMMs may retain their data for a significant amount of time – up to several minutes. That may potentially allow the DIMMs to be removed from one system and installed in another without loss of the data contained in them.

Secondary power loss (removing the on board coin-cell battery) will destroy system data in the PCH (platform controller hub), including time-of-day information.

There are other volatile and non-volatile components on the devices or peripherals attached to the motherboard:

> The Video Card contains volatile and non-volatile memory components. The volatile frame buffer memory will lose data once power is removed. The non-volatile memory (Video BIOS) stores only video card setup information. The video BIOS is not accessible by the user.

> The CD-RW/Diskette Drives/DVD-R/W/Blu Ray DVD-R/W are input/output devices, whereas the DVD-ROM is an input device only. All data is processed through cache (volatile) memory. Any associated internal NVRAM is factory programmed, does not contain any user data, and is not accessible by the user.

> The SAS and/or SATA Hard Drives and optional storage controller cards store non-volatile data. All data is processed through cache (volatile) memory. Any associated internal NVRAM is factory programmed, does not contain any user data, and is not accessible by the user. These devices may be removed.

> The Monitor may retain "Burn-In" images after long periods of displaying static data. If any burn-in images exist, they can readily be seen using simple procedures. NV memory components are used for storing monitor calibration/configuration data & are not accessible by the user.

To help clarify memory volatility and data retention in situations where the system is put in different ACPI power states, the following information is provided regarding ACPI power states S0, S1, S3, S4 and S5:

- S0 state is the working state where the dynamic RAM is maintained and is read/write by the processor.
- S1 state is a low wake-up latency sleeping state. In this state, no system context is lost (CPU or chip set) and hardware maintains all system contexts.
- S3 is called "suspend to RAM" state or stand-by mode. In this state the dynamic RAM is maintained. Dell systems will be able to go to S3 if the OS and the peripherals used in the system supports S3 state. Windows XP, Windows Vista and Windows 7 all support S3 state.
- S4 is called "suspend to disk" state or "hibernate" mode. There is no power. In this state, the dynamic RAM is not maintained. If the system has been commanded to enter S4, the OS will write the system context to a non-volatile storage file and leave appropriate context markers. When the system is coming back to the working state, a restore file from the non-volatile storage can occur. The restore file has to be valid. Dell systems will be able to go to S4 if the OS and the peripherals support S4 state. Windows XP, Windows Vista and Windows 7 all support S4 state.
- S5 is the "soft" off state. There is no power. The OS does not save any context to wake up the system. No data will remain in any component on the system board, i.e. cache or memory. The system will require a complete boot when awakened. Since S5 is the shut off state, coming out of S5 requires power on which clears all registers.

The Precision workstation T5600 supports all of the above states.

Please direct any questions to the undersigned

Very truly yours;

Dell Marketing L.P.