DELL ™

OPTIPLEX ™ 980

TECHNICAL GUIDEBOOK

INSIDE THE OPTIPLEX 980

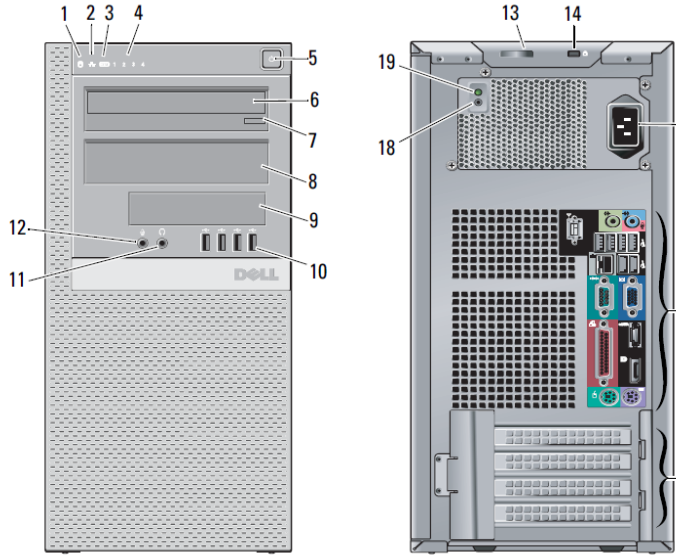
OVERVIEW

MARKETING SYSTEM CONFIGURATIONS

DETAILED ENGINEERING SPECIFICATIONS

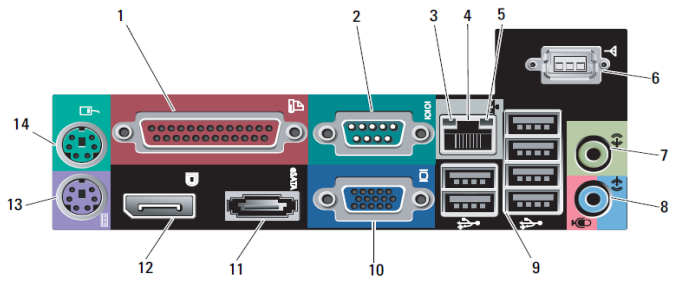
Mini Tower (MT) Computer View

Front and Back View



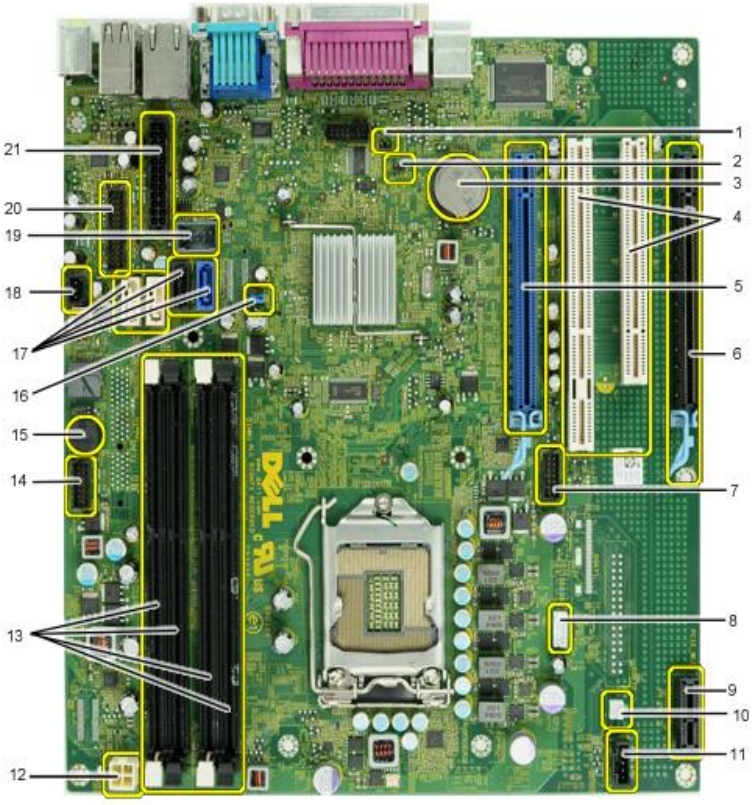
1	Drive Activity Light
2	Network Activity Light
3	Wi-Fi Activity Light (optional)
4	Diagnostic Lights (4)
5	Power Button, Power Lights
6	CD/DVD Drive
7	CD/DVD Drive Eject Button
8	CD/DVD Drive Filler Panel
9	Flex Bay
10	USB 2.0 Connectors (4)
11	Headphone connector
12	Microphone connector
13	Padlock Ring
14	Security Cable Slot
15	Power Cable Connector
16	Back Panel Connectors
17	Expansion Card Slots (4)
18	Power Supply Diagnostic Button
19	Power Supply Diagnostic Light

Back Panel Connectors



1	Parallel Connector
2	Serial Connector
3	Link Integrity Light
4	Network Adapter Connector
5	Network Activity Light
6	Wi-Fi Antenna (optional)
7	Headphone Connector
8	Line-in/Microphone Connector
9	USB 2.0 connectors (6)
10	VGA Connector
11	eSATA Connector
12	DisplayPort Connector
13	Keyboard Connector
14	Mouse Connector

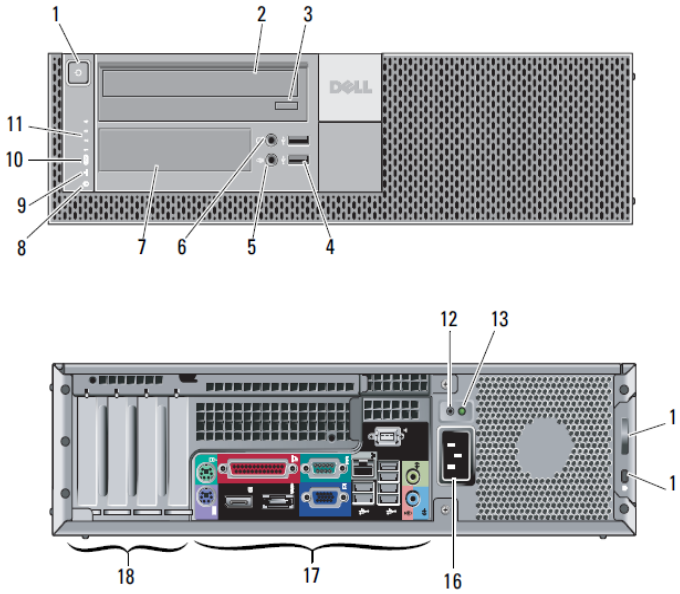
System Board



1	Service Mode jumper (SERVICE_MODE)
2	RTC reset jumper (RTCRST)
3	Battery socket (BATTERY)
4	PCI card connectors (SLOT 2 & 3)
5	PCI Express x16 card connector(SLOT1)
6	PCI Express x16 (wired as x4) connector (SLOT4)
7	Internal serial card connector (SERIAL2)
8	Speaker connector (INT_SPKR)
9	PCI Express x1 Wireless card connector (PCIE_WLS1)
10	Thermal Sensor connector(THRM3)
11	Fan connector (FAN_CPU)
12	Power connector (12V POWER)
13	Memory module connectors (DIMM_1-4)
14	Front-Panel connector (FRONTPANEL)
15	Internal buzzer (BEEP)
16	Password jumper (PSWD)
17	SATA drive connectors (SATA0-3)
18	Intruder connector (INTRUDER)
19	Internal USB connector (INT_USB)
20	Front I/O Connector(FIO)
21	Power connector (MICRO_PWR)

Desktop (DT) Computer View

Front and Back View



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3	CD/DVD Drive Eject Button
4	USB 2.0 Connectors (2)
5	Microphone Connector
6	Headphone Connector
7	Flex Bay
8	Drive Activity Light
9	Network Activity Light
10	Wi-Fi Activity Light (optional)
11	Diagnostic Lights (4)
12	Power Supply Diagnostic Button
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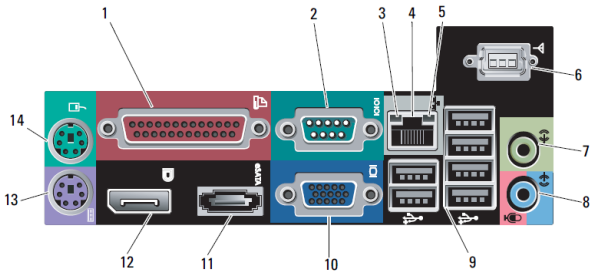
16	Power Cable Connector
17	Back Panel Connectors
18	Expansion Card Slots (4)

Back Panel Connectors



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11	eSATA Connector
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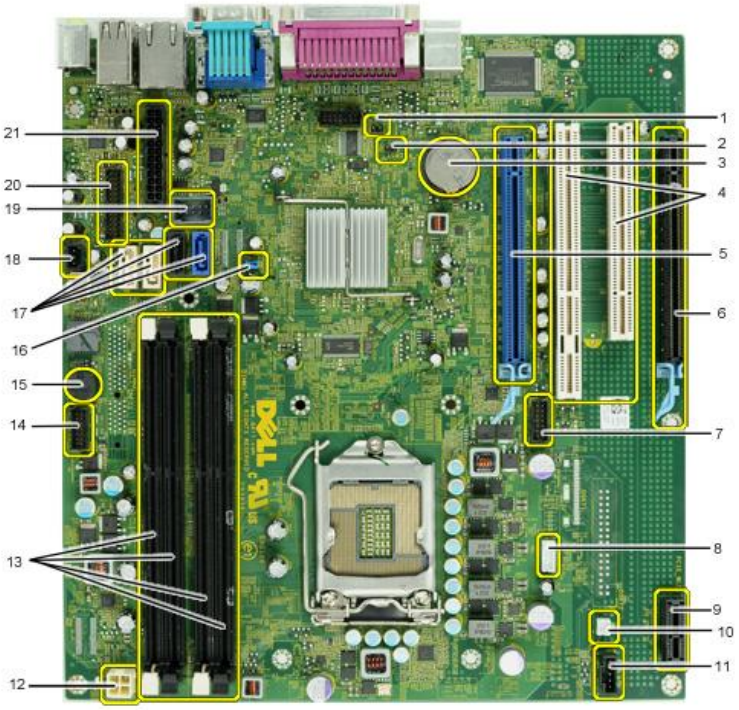
13	Keyboard Connector
14	Mouse Connector

System Board



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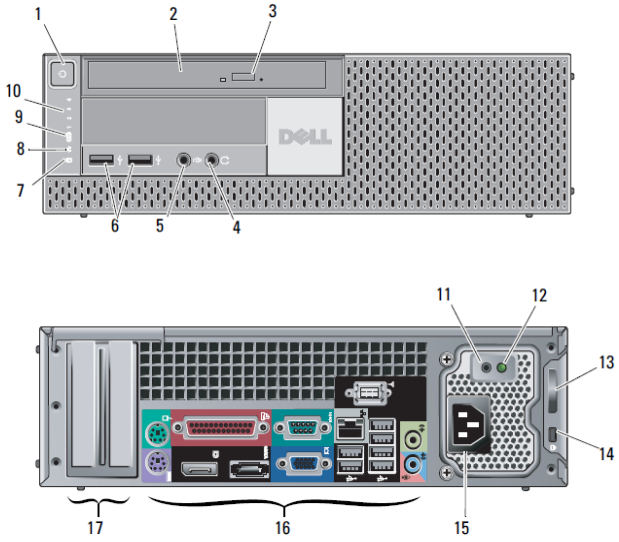
Small Form Factor (SFF) Computer View

Front and Back View



1	Power Button, Power Light
2	CD/DVD Drive (slim-line)
3	CD/DVD Drive Eject Button
4	Headphone Connector
5	Microphone Connector
6	USB 2.0 Connectors (2)
7	Drive Activity Light
8	Network Activity Light
9	Wi-Fi Activity Light (optional)
10	Diagnostic Lights (4)
11	Power Supply Diagnostic Button
12	Power Supply Diagnostic Light
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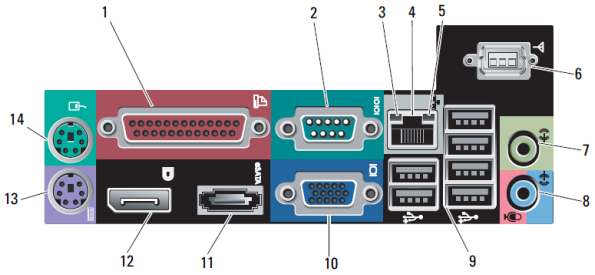
14	Security Cable Slot
15	Power Cable Connector
16	Back Panel Connectors
17	Expansion Card slots (2)

Back Panel Connectors



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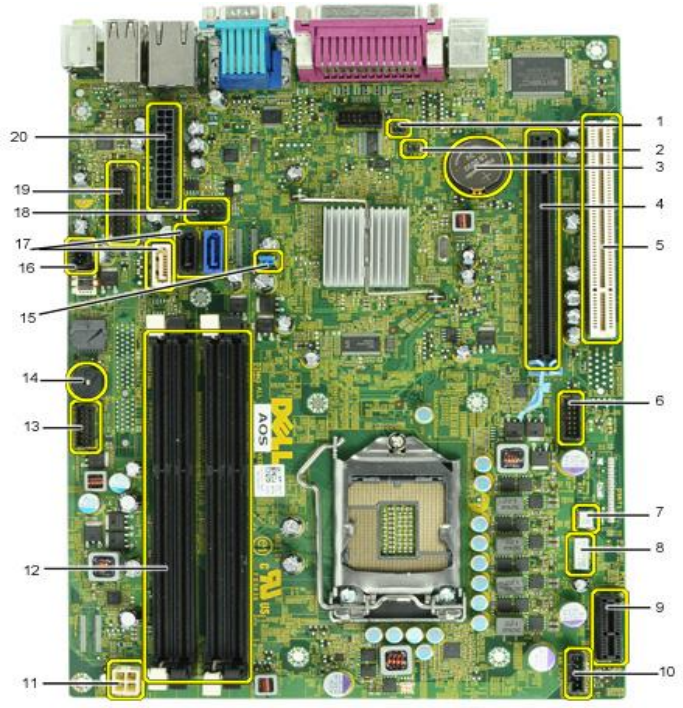
System Board



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Marketing System Configurations

NOTE: Offerings may vary by region. 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 System

NOTE: One of the following Operating Systems will be preinstalled.

	MT	DT	SFF
Windows 7® operating system	Windows 7® Home Basic (32 bit), Windows 7® Home Premium (32 bit), Windows 7® Professional (32 and 64 bit), Windows 7® Ultimate (32 bit)		
Windows Vista® operating system	Windows Vista® SP2 Home Basic (32 bit) Windows Vista® SP2 Business (32 and 64 bit), Windows Vista® SP2 Ultimate (32 bit), Windows Vista® SP2 Business downgrade via Windows 7® Professional Windows Vista® SP2 Ultimate downgrade via Windows 7® Ultimate		
Windows XP® operating system	Windows XP® Professional SP3 (32 bit) downgrade via Windows 7® Professional or Ultimate Windows XP® Professional SP3 (32 bit) downgrade via Windows Vista® Business or Ultimate		
Other	Ubuntu® Linux® (select countries) FreeDOS for (n-series),		
OS Media Support	X	X	X

Chipset

	MT	DT	SFF
Chipset	Intel® Q57 Express Chipset		
Non-volatile memory on chipset			
BIOS Configuration SPI (Serial Peripheral Interface)	64Mbit (8MB) located at SPI_2 on chipset 16Mbit (2MB) located at SPI_1 on chipset		
TPM 1.2 Security Device (Trusted Platform Module)[1]	16KB located at TPM on chipset		
TCM (Trusted Computing Module)	Available in China Only		
Non-TPM	Available in select countries		
NIC EEPROM	LOM configuration contained within SPI_1/SPI_2 – no dedicated LOM EEPROM		

[1]TPM not available in some regions

Processor

NOTE: Global Standard Products (GSP) are a subset of Dell's relationship products that are managed for availability and synchronized 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 identified below will be made available to Dell customers.

NOTE:

- **Processor numbers are not a measure of performance.**
- **Quad Core processors require a discrete add-in graphics card.**
- **Processor availability subject to change and may vary by region/country**

	MT	DT	SFF
Intel Quad Core processors (require discrete graphics card)			
Intel® Core™ i7 Processor 870 / 2.93GHz, 8M, VT-x, VT-d, TXT (vPro™)	X-GSP	X-GSP	X-GSP
Intel® Core™ i7 Processor 860 / 2.80GHz, 8M, VT-x, VT-d, TXT (vPro™)	X-GSP	X-GSP	X-GSP
Intel® Core™ i5 Processor 750 / 2.66GHz, Turbo Boost, 8M, VT-x	X	X	X
Intel Dual Core processors			
Intel® Core™ i5 Processor 670 / 3.46GHz, HT, Turbo Boost, 4M, VT-x, VT-d, TXT (vPro™)	X-GSP	X-GSP	X-GSP
Intel® Core™ i5 Processor 660 / 3.33GHz, HT, Turbo Boost, 4M, VT-x, VT-d, TXT (vPro™)	X-GSP	X-GSP	X-GSP
Intel® Core™ i5 Processor 650 / 3.20GHz, HT, Turbo Boost, 4M, VT-x, VT-d, TXT (vPro™)	X-GSP	X-GSP	X-GSP
Intel® Core™ i3 Processor 540 / 3.06GHz, HT, 4M	X	X	X
Intel® Core™ i3 Processor 530 / 2.93GHz, HT, 4M	X	X	X
Intel® Pentium Processor G6950 / 2.80GHz, 3M	X	X	X

Advanced System Manageability Modes

NOTE: Hardware management mode options allow you to select the right systems management feature support for your enterprise. Dell's innovative approach to scalable remote client management offers you a choice of built-in hardware management capabilities across platform offerings.

The latest generation of Intel® vPro™ technology provides the capability to manage your install base of systems regardless of the power state or hardware functionality of the system.

This functionality allows IT to address issues remotely rather than having to physically visit systems.

The OptiPlex 980 supports the latest generation of Intel® vPro™ technology.

Intel® iAMT technology/ Intel® vPro™ technology supports the following features:

-Asset reporting and inventory capabilities, Remote Power Control, Remote troubleshooting and repair, Client System Isolation, Remote patching/ updating, DASH support and IPv6 Support

-Intel® vPro™ technology adds these additional features:

- "Fast Call for Help" (Client Initiated Remote Access / Local Access), Remote KVM with UMA GFX, Microsoft NAP support, Hardened security monitoring, VT support, TxT support and Support for the latest generation of Intel® iCore™ Processors

***The functionality described above requires an appropriate software management console**

	MT	DT	SFF
Intel® Core i7/i5 vPro Technology Enabled (iAMT 6.x)	X	X	X
Intel Standard Manageability Client Systems Management (iAMT 6.x)	X	X	X
No Out of Band Systems Management	X	X	X

Memory

Your computer supports a maximum of 16 GB of memory when you use four 4-GB DIMMs; however, 32-bit operating systems, such as the 32-bit version of Microsoft® Windows® XP, can only use a maximum of 4 GB of address space. Moreover, certain components within the computer require address space in the 4GB range. Any address space reserved for these components cannot be used by computer memory; therefore, the amount of memory available to the operating system is less than 4GB.

NOTE: The entire 16-GB memory range is available to 64-bit operating systems.

Memory modules should be installed in pairs of matched memory size, speed, and technology. If the memory modules are not installed in matched pairs, the computer will continue to operate, but with a slight reduction in performance.

	MT	DT	SFF
Type: DDR3 Synch DRAM Non-ECC Memory			
DIMM Slots	4	4	4
DIMM Capacities	Up to 16GB	Up to 16GB	Up to 16GB
Minimum Memory	1GB	1GB	1GB
Maximum Memory with 1333MHz speed memory	16GB[1]	16GB[1]	16GB[1]
Configurations:			
1333MHz Memory configurations			
16GB[1] DDR2 Non-ECC SDRAM, 1333MHz, (4 DIMM)	X	X	X
8GB[1] DDR2 Non-ECC SDRAM, 1333MHz, (4 DIMM)	X	X	X
8GB[1] DDR2 Non-ECC SDRAM, 1333MHz, (2 DIMM)	X	X	X
4GB[1] DDR2 Non-ECC SDRAM, 1333MHz, (4 DIMM)	X	X	X
4GB[1] DDR2 Non-ECC SDRAM, 1333MHz, (2 DIMM)	X	X	X
4GB[1] DDR2 Non-ECC SDRAM, 1333MHz, (1 DIMM)	X	X	X
3GB DDR2 Non-ECC SDRAM, 1333MHz, (3 DIMM)	X	X	X
2GB DDR2 Non-ECC SDRAM, 1333MHz, (2 DIMM)	X	X	X
2GB DDR2 Non-ECC SDRAM, 1333MHz, (1 DIMM)	X	X	X
1GB DDR2 Non-ECC SDRAM, 1333MHz, (1 DIMM)	X	X	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.

Drives and Removable Storage

	MT	DT	SFF
Bays:			
3.5-inch bay (External)	1	1	1 (slimline)
5.25-inch bay (External)	2	1	1 (slimline)
Hard Drives Supported (Internal and External)5	2 x 3.5” Or 2 x 2.5”	1 x 3.5” Or 2 x 2.5”	1 x 3.5” Or 2 x 2.5”
Optical Drives Supported (External)	2	1	1 (slimline)
Interface:			
SATA	4	3	3
3.5” Hard Drives:			
160GB[1] SATA 10K RPM HDD	X	X	X
500GB[1] SATA 7200 RPM HDD	X	X	X
320GB[1] SATA 7200 RPM HDD	X	X	X
250GB[1] SATA 7200 RPM HDD	X	X	X
160GB[1] SATA 7200 RPM HDD	X	X	X
2.5” Hard Drives			
128GB[1] SATA Solid State HDD	X	X	X
64GB[1] SATA Solid State HDD	X	X	X
250GB[1] SATA Full Disk Encryption HDD	*X*	*X*	*X*
320GB[1] SATA 7200 RPM HDD	X	X	X
250GB[1] SATA 7200 RPM HDD	X	X	X
160GB[1] SATA 7200 RPM HDD	X	X	X
3.5” RAID 1 Data Protection: (includes two matching capacity/speed hard drives)			
160GB[1] SATA 10K RPM HDD	X		
500GB[1] SATA 7200 RPM HDD	X		
320GB[1] SATA 7200 RPM HDD	X		
250GB[1] SATA 7200 RPM HDD	X		
160GB[1] SATA 7200 RPM HDD	X		
2.5” RAID 1 Data Protection: (includes two matching capacity/speed hard drives)			
320GB[1] SATA 7200 RPM HDD	X	X	X

	MT	DT	SFF
250GB[1] SATA 7200 RPM HDD	X	X	X
160GB[1] SATA 7200 RPM HDD	X	X	X
3.5" RAID 0 Performance: (includes two matching capacity/speed hard drives)			
320GB[1] SATA 10K RPM HDD	X		
1TB[1] SATA 7200 RPM HDD	X		
500GB[1] SATA 7200 RPM HDD	X		
320GB[1] SATA 7200 RPM HDD	X		
2.5" RAID 0 Performance: (includes two matching capacity/speed hard drives)			
500GB[1] SATA 7200 RPM HDD	X	X	X
320GB[1] SATA 7200 RPM HDD	X	X	X
Optical Drive: (SFF requires a slimline optical drive)			
DVD+/-RW[2]	SATA 1.5Gbit/s	SATA 1.5Gbit/s	SATA 1.5Gbit/s
DVD-ROM[3]	SATA 1.5Gbit/s	SATA 1.5Gbit/s	SATA 1.5Gbit/s
DVD+/-RW[2] with Blu-Ray-ROM	SATA 1.5Gbit/s	SATA 1.5Gbit/s	SATA 1.5Gbit/s
Media Card Reader: (uses Floppy Diskette Drive slot)			
Dell 19 in 1 Media Card Reader	480Mb/s		

[1] For hard drives, GB means 1 billion bytes; actual capacity varies with preloaded material and operating environment and will be less.
[2] Discs burned with this drive may not be compatible with some existing drives and players; using DVD+R media provides maximum compatibility.
[3] DVD-ROM drives may have write-capable hardware that has been disabled via firmware modifications.

System Board Connectors

NOTE: See Detailed Engineering Specifications for maximum card dimensions support.

	MT	DT	SFF
PCI Slot(s): number of	2	2	1
PCIe x16 Slot: number of	1	1	1
PCIe x16 (wired as x4) Slot: number of	1	1	0
Flexbay	1	1	1
Serial ATA (SATA)	4	3	3

Graphics/Video Controller

NOTE: MT supports full height card, DT supports low profile card or full height card with optional riser. SFF supports low profile card.

	MT	DT	SFF
Integrated Intel® Graphics Media Accelerator HD[1]	Integrated on system board with specific processors		
Enhanced Graphic/Video Options			
256MB AMD RADEON HD 3450 Graphics, dual DVI or VGA and TV Out	Optional full height or low profile card		
256MB NVIDIA 9300GE Graphics, dual DVI or VGA and TV Out	Optional full height or low profile card		
256MB AMD RADEON HD 3470 Graphics, dual DP	Optional full height or low profile card		
512MB AMD RADEON HD4550 Graphics, dual DP	Optional full height or low profile card		
512MB NVIDIA NVS420 Graphics, quad DP or DVI	NA	NA	Low Profile
1GB NVIDIA GeForce GT330 Graphics, dual DP and DVI	Full height	NA	NA

[1] Up to 1.7 GB of system memory may be allocated to support integrated graphics, depending on operating system, system memory size and other factors.

External Ports/Connectors

NOTE: MT supports full height cards, DT supports low profile cards or full height cards with optional riser. SFF supports low profile cards.

See chassis diagrams section for port/connector locations	MT	DT	SFF
USB 2.0 (includes two internal on MT, DT and SFF)	12	10	10
Serial	One rear, second port optional		
PS/2	Two rear		
eSATA	One rear		
Parallel	One rear		
Network Connector (RJ-45)	One rear		
1394 Controller	Optional full height card or low profile card		
Video: (enabled with specific processors)			
VGA	One rear		
Display Port	One rear		
Audio:			
Microphone-in	One minijack front		
Headphone	One minijack front		

Stereo line-in/micropone	One minijack rear		
Speakers line out	One minijack rear		
Risers: (replaces 1 PCI slot and 1 PCIe slot on DT system board)			
Combo full height riser with 1 PCI and 1 PCIe connector		X	
Dual full height riser with 2 PCI connectors		X	

Communications - Network Adapter (NIC) –

NOTE: MT supports full height card, DT supports low profile card or full height card with optional riser. SFF supports low profile card.

	MT	DT	SFF
Intel® 82578DM Gigabit[1] Ethernet LAN 10/100/1000 (Remote Wake Up, PXE support and Intel Active Management Technology support)	Integrated on system board		
Broadcom NetXtreme 10/100/1000 PCIe Gigabit Networking Card (5722)	Supports full height	Low-profile or full height card with optional riser	Supports low profile card

[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 – Modem

NOTE: MT supports full height card, DT supports low profile card or full height card with optional riser. SFF supports low profile card.

	MT	DT	SFF
V.92 Data/Fax Controllerless Modem	Optional full height or low profile card		

Communications – Wireless

	MT	DT	SFF
Internal Dell wireless 1520 802.11 draft-N WiFi (with Remote Wake Up support)	Custom WLAN Antenna Connector		

Audio and Speakers

	MT	DT	SFF
RealTek ALC269 High Definition Audio	Integrated on system board		
Internal Chassis Speaker	Optional		
Dell AX210 USB Stereo Speakers	Optional		

Dell AX510/AX510PA Dell Flat Panel Display Soundbar	Optional
Dell AY410 Sting 2.1 Muitimedia Speaker System	Optional

Keyboard and Mouse

	MT	DT	SFF
Dell USB QuietKey Keyboard	Optional		
Dell USB Multimedia Pro Keyboard	Optional		
Dell Smart Card USB Keyboard	Optional		
Dell USB Entry Mouse	Optional		
Dell Laser Mouse	Optional		

Security

	MT	DT	SFF
Trusted Platform Module (TPM) 1.2[1]	Integrated on system board		
Chassis Intrusion Switch	Optional		
Dell Smart Card USB Keyboard	Optional		
Chassis lock slot	Standard		

[1]TPM not available in some regions

Service and Support

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

	MT	DT	SFF
3 Year Limited Warranty[1] (3-3-0)	Standard		
3 Year Next Business Day On-site[2] Service (3-3-3)	Optional		
Dell ProSupport	Optional		

[1] For a copy of our guarantees or limited warranties, please write Dell USA L.P., Attn: Warranties, One Dell Way, Round Rock, TX 78682. For more information, visit www.dell.com/warranty.

[2] Service may be provided by third-party. Technician will be dispatched if necessary following phone-based troubleshooting. Subject to parts availability, geographical restrictions and terms of service contract. Service timing dependent upon time of day call placed to Dell. U.S. only.

Software

	MT	DT	SFF
Dell Client Manager	Available via Dell.com		
Dell Control Point	Standard		
Dell OptiPlex ON Reader 2.0	Standard		
Dell Backup & Recovery Manager	Optional		
Norton Internet Security 2010	90 Day Trial or Optional Subscription		
McAfee 10 Security Center	90 Day Trial or Optional Subscription		

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: integrated graphics, one hard drive, one optical drive, and one diskette drive.

	MT	DT	SFF
Chassis Volume liters	32.62	15.08	8.00
Chassis Weight*1 pounds/kilograms	25.3 / 11.6	16.5 / 7.26	13 / 5.90
Chassis Dimensions: (HxWxD)			
Height inches/centimeters	15.8 / 40.8	4.4 / 11.4	3.5 / 9.26
Width inches/centimeters	7.4 / 18.7	15.4 / 39.9	11.8 / 31.4
Depth inches/centimeters	17.2 / 43.3	13.7 / 35.3	12.9 / 34
Shipping Weight*1 pounds/kilograms includes packaging materials	43.5 / 19.73	28.0 / 12.7	11.25/ 28.6
Packaging Parameters (HxWxD)2			
Height inches/centimeters	22.06/ 56.0	20.35/ 51.7	20.75/ 52.7
Width inches/centimeters	20.94/ 53.2	20.04/ 50.9	16.38/ 41.6
Depth inches/centimeters	14.56/ 37.0	11.96/ 30.4	11.25/ 28.6

1 Weights are approximates and may change based on system configuration and included accessories.

2 Dimensions are DAO specific. Each region has unique packing.

System Board Connector Maximum Allowable Dimensions

	MT	DT	SFF
PCI Slot(s) Dimensions: (HxL)	2	2	1
Height inches/centimeters	4.376/11.115	2.731/6.89	
Length inches/centimeters	6.6/16.765*	6.6/16.765	
PCIe x16 Slot Dimensions: (HxL)	2	1	1

Height inches/centimeters	4.376/11.115	2.731/6.89	
Length inches/centimeters	6.6/16.765*	6.6/16.765	
PCIe x16 (wired as x4)Slot Dimensions: (HxL)	1	1	0
Height inches/centimeters	4.376/11.115	2.731/6.89	
Length inches/centimeters	6.6/16.765*	6.6/16.765	
Wireless Slot for custom card	1	1	1
Risers: (replaces 1 PCI slot and 1 PCIe slot on DT system board)			
Combo Full Height Riser with 1 PCI and 1 PCIe connector (HxL)		1	
Height inches/centimeters		4.376/11.115	
Length inches/centimeters*,**		6.90in/17.53** *cm	
Dual Full Height Riser with 2 PCI connectors (HxL)		1	
Height inches/centimeters		4.376/11.115	
Length inches/centimeters*,**		6.90in/17.53** *cm	

* Card length can be longer than standard Half-Length Card but cannot be a Full-Length Card.

** 6.9/17.53 in/cm is longer than the standard Half-Length Card

System Level Environmental and Operating Conditions

	MT	DT	SFF
Temperature			
Operating	10° to 35° C (50° to 95° F)		
Non-Operating (Storage)	-40° to 65° C (-40° to -149° F)		
Relative Humidity	20% to 80% (non-condensing)		
Maximum vibration			
Operating	5 to 350 Hz at 0.0002 G2/Hz		
Non-Operating	5 to 500 Hz at 0.001 to 0.01 G2/Hz		
Maximum Shock			
Operating	40 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 20 in/sec [51 cm/sec])		
Non-Operating	105 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 50 in/sec [127 cm/sec])		

	MT	DT	SFF
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

	MT		DT		SFF	
	APFC	EPA	APFC	EPA	APFC	EPA
Power Supply Wattage	**305W**	**255W**	**255W**	**255W**	**235W**	**235W**
AC input Voltage Range	90 – 264Vac	90 – 264Vac	90 – 264Vac	90 – 264Vac	90 – 264Vac	90 – 264Vac
AC input current (low ac range/high AC range)	5.6/2.8 Arms	3.6/1.8 Arms	5.0/2.5 Arms	4.0/2.0 Arms	4.5/2.25 Arms	3.5/1.75 Arms
AC input Frequency	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz
AC holdup time (80% load)	16 ms	16 ms	16 ms	16 ms	16 ms	16 ms
Average Efficiency (Energy Star Compliant)		87 – 90 – 87% @ 20 – 50 – 100% load		87 – 90 – 87% @ 20 – 50 – 100% load		87 – 90 – 87% @ 20 – 50 – 100% load
Minimum Efficiency (Active PFC)	65%		65%		65%	
DC parameters						
+3.3v output	8.0 A	8.0 A	7.0 A	7.0 A	5.0 A	5.0 A
+5.0v output	16.0 A	16.0 A	15.0 A	15.0 A	16.0 A	16.0 A
+12.0v output	15.0 A & 10.0 A	15.0 A & 10.0 A	18.0 A	18.0 A	17.0 A	17.0 A
+5.0v auxiliary output	4.0 A	4.0 A	4.0 A	4.0 A	4.0 A	4.0 A
-12.0v output	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A
Max total power	305 W	255 W	255 W	255 W	235 W	235 W
Max combined +3.3v / +5.0v power	80 W	80 W	91.5 W	91.5 W	88 W	88 W
Max combined 12.0v power (note: only if more than one 12v rail)	240W	240W	N/A	N/A	N/A	N/A

BTUs/h (based on PSU max wattage)	1603 BTU	1000 BTU	1341 BTU	1000 BTU	1235 BTU	921 BTU
Power Supply Fan	80 x 25mm	80 x 25mm	92 x 25mm	92 x 25mm	80 x 15mm or 80 x 20mm	80 x 15mm or 80 x 20mm
Compliance:						
Energy Star Compliant	No	Yes	No	Yes	No	Yes
Blue Angel Compliant	Yes	Yes	Yes	Yes	Yes	Yes
Climate Savers / 80Plus Compliant	No	Gold	No	Gold	No	Gold
FEMP Standby Power Compliant	Yes	Yes	Yes	Yes	Yes	Yes
3.3v CMOS battery (type and estimated battery life)	3-V CR2032 lithium coin cell. Est. 5 year life					

Audio

Integrated RealTek ALC269 High Definition Audio	**MT**	**DT**	**SFF**
High Definition Stereo support	X	X	X
Number of channels	2		
Number of Bits / Audio resolution	16, 20, and 24-bit resolution		
Sampling rate (recording/playback)	Variable Any multiple or sub-multiple of 48kHz or 44.1kHz		
Signal to Noise Ratio	98dB audio outputs, -98dB audio inputs		
Analog Audio	X	X	X
Dolby Digital			
THX			
Digital out (S/PDIF)			
Audio Jack Impedance			
Microphone	150 kΩ		
Line-In	150 kΩ		
Line-Out	190 Ω		
Headphone	.5 Ω		
Internal Speaker Power Rating	2W		

Communications - Integrated LAN

NOTE: MT supports full height card, DT supports low profile card or full height card with optional riser. SFF supports low profile card.

Integrated Intel® 82578 Gigabit Ethernet LAN 10/100/1000	MT	DT	SFF
External Connector Type	RJ45		
Data Rates supported	10/100/1000 Mbps		
Controller Details			
Controller bus architecture (example PCIe 1.0a x1)	Intel Gigabit LAN Connect Interface (GLCI) and LAN Connect Interface (LCI)		
Integrated memory	N/A		
Data transfer mode (example Bus-Master DMA)	N/A		
Power consumption (full operation per data rate connection speed)	781mW (Max.)		
Power consumption (standby operation) with WOL enabled	200mW (Max, 100Mb) 66mW (Max, 10Mb)		
Power consumption (standby operation) with WOL disabled in BIOS	0mW (Max)		
Power consumption (standby operation) with WOL disabled with driver	47mW (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 Mb (full-duplex)		
Environmental			
Operating temperature	0° C to 85° C (32° F to 185° F)		
Operating humidity	20% to 80% (non-condensing)		
Operating System Driver Support	Windows XP 32-Bit, Windows Vista 32-bit, Windows Vista 64-bit, Win7 32-bit, Win7 64Bit.		
Manageability (examples WOL, PXE..)	WOL, PXE 2.1		
Management Capabilities Alerting (examples ASF 2.0 AMT…)	iAMT6.0		

[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 – Networking Card

NOTE: MT supports full height card, DT supports low profile card or full height card with optional riser. SFF supports low profile card.

Broadcom 5722 NetXtreme 10/100/1000 PCIe Gigabit[1] Networking Card	**MT**	**DT**	**SFF**
Connector Type	RJ45		
Data Rates supported	10/100/1000 Mbps Half/Full duplex		
Controller Details			
Controller bus architecture (example PCIe 1.0a x1)	PCIe 1.0a x1		
Integrated memory	40KB		
Data transfer mode (example Bus-Master DMA)	Bus-Master DMA		
Power consumption (full operation per data rate connection speed)	1.41W (427mA @ +3.3V)		
Power consumption (standby operation)	Less than 300mW		
IEEE standards compliance (example 802.1P)	802.3z, 802.3x, Dynamic 802.3ad, 802.3 p, 802.1Q		
Hardware Certifications (example FCC, B, GS mark…)	FCC B, VCCI B, CE		
Boot ROM Support	No		
Network Transfer Mode (example Full Duplex, Half Duplex)	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	10BASE-T (full-duplex - 20Mbps, half-duplex – 10Mbps)* 100BASE-T (full-duplex – 200Mbps, half-duplex - 100Mbps)* 1000BASE-T (full-duplex - 2000Mbps, half-duplex – 1000Mbps)* * Depends on the system environment.		
Environmental			
Operating temperature	0° C to 55° C (32° F to 131° F)		
Operating humidity	5% ~ 85% (non-condensing)		
Operating System Driver Support	Windows XP 32-bit, Windows Vista 32-bit, Windows Vista 64-bit, Win7 32-bit, Win7 64Bit.		
Manageability (examples WOL, PXE..)	WOL, PXE2.1, ACPI, CIM, SNMP		
Management Capabilities Alerting (examples ASF 2.0 AMT…)	None		

[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 – Modem

NOTE: MT supports full height card, DT supports low profile card or full height card with optional riser. SFF supports low profile card.

V.92 Data/Fax Controllerless Modem	MT	DT	SFF
Bus	PCI		
External Connector	RJ-11		
Data Transmission	PCM - Pulse Coded Modulation (V.92/V.90) TCM - Trellis Coded Modulation (V.90/V.34/V.32 bis/V.32)		
Data Speeds	56kbps receive, 48kbps transmit		
Data Standards	ITU V.92/V.90, V.34/V.32 bis/V.32		
Fax Speeds	14.4kbps		
Fax Mode Capabilities	2-wire, half-duplex, synchronous		
Error Correction and Data Compression	V.44, V.42, V.42bis, MNP 2-4, MNP 5		
Power Management	WOR (wake on ring) capable		
Upgradeability	Driver upgradeable		
Video	V.80 Synchronous Access Mode (SAM) can be supported by software applications (not driver)		
Operating Temperature	0~50 degree C		
Operating Humidity	45 degree C 90% max		
Operating System Driver Support	Windows XP 32-bit, Windows Vista 32-bit, Windows Vista 64-bit, Win7 32-bit, Win7 64Bit.		
Power Requirements	+3.0V~+3.6V, 116.6mW max		
Chipset	Conexant SmartHSFs/LF (CX11256 & CX20493)		
Dimensions of full height card inches/centimeters (L X H)	L: 5.25'/13.325cm H: 4.73'/12.002cm		
Dimensions of low profile card inches/centimeters (L X H)		L: 5.26'/13.366cm H: 3.12'/7.923cm	

Communications – Wireless

Internal DW1520 802.11 draft-N WiFi (with Remote Wake Up support)	MT	DT	SFF
External Connector Type	Custom WLAN Antenna Connector		
Controller Details			
Controller bus architecture	PCIe 1.1 x1		

Internal DW1520 802.11 draft-N WiFi (with Remote Wake Up support)	MT	DT	SFF
WLAN standards supported	802.11a, 802.11b, 802.11g, 802.11n		
802.11b Data Rates supported	11, 5.5, 2, 1 Mbps		
802.11a Data Rates supported	54, 48, 36, 24, 18, 12, 9, 6 Mbps		
802.11g Data Rates supported	54, 48, 36, 24, 18, 12, 9, 6 Mbps		
802.11n Data Rates supported	300, 270, 243, 240, 180, 150, 144, 135, 130, 120, 117, 115.5, 90, 86.667, 72.2, 65, 60, 57.8, 45, 43.3, 30, 28.9, 21.7, 15, 14.4, 7.2 Mbps		
Security	802.1x, WEP, WPA/WPA2, TKIP, CCX v1, CCX v2, CCX v3, CCX v4, and CCX v5 128-bit OCB mode AES, 802.11i		
Operating temperature	0 - 70°C		
Operating humidity	85% maximum non-condensing		
Operating System Driver Support	Windows XP 32-bit, Windows Vista 32-bit, Windows Vista 64-bit, Win7 32-bit, Win7 64Bit.		

Graphics/Video Controller

NOTE: MT supports full height card, DT supports low profile card or full height card with optional riser. SFF supports low profile card.

Integrated Intel GMA X4500HD	MT	DT	SFF
Bus Type	Integrated		
GPU core clock	350 MHz Integrated 24 bit RAMDAC		
Frame Buffer Memory (onboard and shared) Size and Speed	XP: Up to 1GB shared system memory with 2GB system memory Vista and Win7: Up to 1.4GB shared system memory with 4GB or more system memory		
Overlay Planes	Yes		
Maximum Color Depth	32 bit		
Maximum Vertical Refresh Rate	85 Hz		
Multiple Display Support	Yes		
Operating Systems Graphics/ Video API Support	OpenGL 2.0/DirectX 10.0		
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	Up to 2560x11600 @ 60Hz (DP)		

	Up to 1920x1200 @ 60Hz (DVI & VGA) Up to 1600x1200 @ 85Hz (VGA only)
External connectors	VGA, DisplayPort
Environmental Operating Conditions (Non-Condensing):	
Operating Temperature Range	0° C to 70° C (32° F to 158° F)
Relative Humidity Range	20% to 80% (non-condensing)
Display Port	
Bus Type	AUX 1, 2, 4 lanes
Maximum supported resolution	Up to 2560x1600 @ 60Hz
Maximum power consumption	N/A
External connectors	Display Port
Dongle Supported	Display Port to DVI Display Port to VGA Display Port to HDMI

[1] Up to 1.7 GB of system memory may be allocated to support integrated graphics, depending on operating system, system memory size and other factors.
[2] The Display Port controller does not support multi-monitor display in DOS, but it does in the OS after the driver is loaded.
[3] Populating a up-graphics card in the x16 slot disabled onboard video.

256MB AMD Radeon™ HD 3450 Graphics dual DVI or VGA and TV Out	**MT**	**DT**	**SFF**
Bus Type (example integrated or PCIe x16)	PCIEx16		
GPU core clock	600Mhz		
Frame Buffer Memory (onboard and shared) Size and Speed	500Mhz		
Maximum power consumption	22W		
Overlay Planes	Yes		
Maximum Color Depth	32-bit		
Maximum Vertical Refresh Rate	85Hz		
Multiple Display Support	Yes		
Operating Systems Graphics/ Video API Support	D3D and OpenGL		
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	Max : 1920x1440/32bpp @ 75Hz Min : 640x480/8bpp @ 60Hz		
External connectors	DMS-591 and S-video		
Dimensions of full height card inches/centimeters (L x H)	167.64mm x 120mm	167.64mm x 120mm	

256MB AMD Radeon™ HD 3450 Graphics dual DVI or VGA and TV Out	**MT**	**DT**	**SFF**
Dimensions of low profile card inches/centimeters (L x H)		167.64mm x 85mm	
Environmental Operating Conditions (Non-Condensing):			
Operating Temperature Range	10°-50° C		
Relative Humidity Range	5-90% RH		
Altitude Range	0-20,000 ft.		

[1]DMS-59 to VGA or DMS-59 to DVI adaptors required.

256MB nVidia 9300GE Graphics, dual DVI or VGA and TV Out	**MT**	**DT**	**SFF**
Bus Type (example integrated or PCIe x16)	PCIEx16		
GPU core clock	540Mhz		
Frame Buffer Memory (onboard and shared) Size and Speed	500Mhz		
Maximum power consumption	25W		
Overlay Planes	Yes		
Maximum Color Depth	32-bit		
Maximum Vertical Refresh Rate	85Hz		
Multiple Display Support	Yes		
Operating Systems Graphics/ Video API Support	D3D and OpenGL		
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	Max : 1920x1440/32bpp @ 75Hz Min : 640x480/8bpp @ 60Hz		
External connectors	DMS-59[1] and S-video		
Dimensions of full height card inches/centimeters (L x H)	167.64mm x 120mm	167.64mm x 120mm	
Dimensions of low profile card inches/centimeters (L x H)		167.64mm x 85mm	
Environmental Operating Conditions (Non-Condensing):			
Operating Temperature Range	10°-50° C		
Relative Humidity Range	5-90% RH		
Altitude Range	0-20,000 ft.		

[1]DMS-59 to VGA or DMS-59 to DVI adaptors required.

256MB AMD Radeon™ HD 3470 Graphics, dual DP	MT	DT	SFF
Bus Type (example integrated or PCIe x16)	PCIEx16		
GPU core clock	750Mhz		
Frame Buffer Memory (onboard and shared) Size and Speed	500Mhz		
Maximum power consumption	18W		
Overlay Planes	Yes		
Maximum Color Depth	32-bit		
Maximum Vertical Refresh Rate	85Hz		
Multiple Display Support	Yes		
Operating Systems Graphics/ Video API Support	D3D and OpenGL		
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	Max : 1920x1440/32bpp @ 75Hz Min : 640x480/8bpp @ 60Hz		
External connectors	2 Display Port		
Dimensions of full height card inches/centimeters (L x H)	167.64mm x 120mm	167.64mm x 120mm	
Dimensions of low profile card inches/centimeters (L x H)		167.64mm x 85mm	
Environmental Operating Conditions (Non-Condensing):			
Operating Temperature Range	10°-50° C		
Relative Humidity Range	5-90% RH		
Altitude Range	0-20,000 ft.		

512MB AMD Radeon™ HD 4550 Graphics, dual DP	MT	DT	SFF
Bus Type (example integrated or PCIe x16)	PCIEx16		
GPU core clock	750Mhz		
Frame Buffer Memory (onboard and shared) Size and Speed	800Mhz		
Maximum power consumption	25W		
Overlay Planes	Yes		
Maximum Color Depth	32-bit		
Maximum Vertical Refresh Rate	85Hz		
Multiple Display Support	Yes		
Operating Systems Graphics/ Video API Support	D3D and OpenGL		
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	Max : 1920x1440/32bpp @ 75Hz		

512MB AMD Radeon™ HD 4550 Graphics, dual DP	**MT**	**DT**	**SFF**
	Min : 640x480/8bpp @ 60Hz		
External connectors	2 Display Port(1)		
Dimensions of full height card inches/centimeters (L x H)	167.64mm x 120mm	167.64mm x 120mm	
Dimensions of low profile card inches/centimeters (L x H)		167.64mm x 85mm	
Environmental Operating Conditions (Non-Condensing):			
Operating Temperature Range	10°-50° C		
Relative Humidity Range	5-90% RH		
Altitude Range	0-20,000 ft.		

(1) Dongles Supported: DP-VGA (RN699), DP-DVI (23NVR), DP-DL DVI (XT625), DP-HDMI(TK041)

512MB nVidia NVS 420 Graphics, quad DP or DVI	**MT**	**DT**	**SFF**
Bus Type (example integrated or PCIe x16)	PCIEx16		
GPU core clock	540Mhz		
Frame Buffer Memory (onboard and shared) Size and Speed	700Mhz		
Maximum power consumption	40W		
Overlay Planes	Yes		
Maximum Color Depth	32-bit		
Maximum Vertical Refresh Rate	85Hz		
Multiple Display Support	Yes		
Operating Systems Graphics/ Video API Support	D3D and OpenGL		
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	Max : 1920x1440/32bpp @ 75Hz Min : 640x480/8bpp @ 60Hz		
External connectors	VHDCI (1)		
Dimensions of full height card inches/centimeters (L x H)	167.64mm x 120mm	167.64mm x 120mm	
Dimensions of low profile card inches/centimeters (L x H)		167.64mm x 85mm	
Environmental Operating Conditions (Non-Condensing):			
Operating Temperature Range	10°-50° C		
Relative Humidity Range	5-90% RH		
Altitude Range	0-20,000 ft.		

(1) Dongles supported: VHDCI-DP (J772M), VHDCI-DVI-D (F908M), DP-VGA (RN699)

1GB nVidia GeForce GT 330 Graphics, dual DP and DVI	MT	
Bus Type (example integrated or PCIe x16)	PCIEx16	
GPU core clock	650Mhz	
Frame Buffer Memory (onboard and shared) Size and Speed	800Mhz	
Maximum power consumption	75W	
Overlay Planes	Yes	
Maximum Color Depth	32-bit	
Maximum Vertical Refresh Rate	85Hz	
Multiple Display Support	Yes	
Operating Systems Graphics/ Video API Support	D3D and OpenGL	
Supported Resolutions and Max Refresh Rates (Hz) (Note: Analog and/or digital)	Max : 1920x1440/32bpp @ 75Hz Min : 640x480/8bpp @ 60Hz	
External connectors	DVI-I and DP (1)	
Dimensions of full height card inches/centimeters (L x H)	167.64mm x 120mm	167.64mm x 120mm
Dimensions of low profile card inches/centimeters (L x H)		167.64mm x 85mm
Environmental Operating Conditions (Non-Condensing):		
Operating Temperature Range	10°-50° C	
Relative Humidity Range	5-90% RH	
Altitude Range	0-20,000 ft.	

(1) Dongles Supported: DP-VGA (RN699), DP-DVI (23NVR), DP-DL DVI (XT625), DP-HDMI(TK041)

Hard Drives[1]

3.5" 160GB SATA 7200 RPM HDD	
Capacity (bytes)	160,041,885,696
Dimensions inches (W x D x H)	5.87 x 4 x 1
Interface type and Maximum speed	Up to 3Gb/s
Internal buffer size	8 MB
Average Seek Time	8.5 ms
Rotational Speed	7200 rpm

Logical Blocks	312,581,808
Power Source	
DC Power (Max)	Idle 7.0W, Active 10.0W
DC Current	5V (.8A) and 12V (1.8A)
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

3.5" 250GB SATA 7200 RPM HDD	
Capacity (bytes)	250,059,350,016
Dimensions inches (W x D x H)	5.87 x 4 x 1
Interface type and Maximum speed	Up to 3Gb/s
Internal buffer size	8 MB
Average Seek Time	8.5 ms
Rotational Speed	7200 rpm
Logical Blocks	488,397,168
Power Source	
DC Power (Max)	Idle 7.0W, Active 10.0W
DC Current	5V (.8A) and 12V (1.8A)
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^{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

3.5" 320GB SATA 7200 RPM HDD	
Capacity (bytes)	320,072,933,376
Dimensions inches (W x D x H)	5.87 x 4 x 1
Interface type and Maximum speed	Up to 3Gb/s
Internal buffer size	16 MB
Average Seek Time	8.5 ms
Rotational Speed	7200 rpm
Logical Blocks	625,142,448
Power Source	
DC Power (Max)	Idle 7.0W, Active 10.0W
DC Current	5V (.8A) and 12V (1.8A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5^{0}C to 60^{0}C
Relative Humidity Range	20% to 80% non-condensing
Maximum Wet Bulb Temperature	29^{0}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

3.5" 500GB SATA 7200 RPM HDD	
Capacity (bytes)	500,107,862,016
Dimensions inches (W x D x H)	5.87 x 4 x 1

Interface type and Maximum speed	Up to 3Gb/s
Internal buffer size	16 MB
Average Seek Time	8.5 ms
Rotational Speed	7200 rpm
Logical Blocks	976,773,168
Power Source	
DC Power (Max)	Idle 7.0W, Active 10.0W
DC Current	5V (.8A) and 12V (1.8A)
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

3.5" 160GB SATA 10000 RPM HDD	
Capacity (bytes)	160,041,885,696
Dimensions inches (W x D x H)	5.787 x 4 x 1 (includes sled)
Interface type and Maximum speed	Up to 3Gb/s
Internal buffer size	16 MB
Average Seek Time	4.2 ms (average read)
Rotational Speed	10000 rpm
Logical Blocks	312,581,808
Power Source	
DC Power (Max)	Idle 7.0W, Active 10.0W
DC Current	5V (.275A) and 12V (.585A)

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	-1000 ft to 10000 ft
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40^0C to 70^0C
Relative Humidity Range	5% to 95% non-condensing
Maximum Wet Bulb Temperature	38^0C
Altitude Range	-1000 ft to 40000 ft

2.5" 160GB SATA 7200 RPM HDD	
Capacity (bytes)	160,144,285,696
Dimensions inches (W x D x H)	Approximately (3.93 x 2.75 x 0.374 inches)
Interface type and Maximum speed	Up to 3Gb/s
Internal buffer size	16 MB
Average Seek Time	12 ms (Read)
Rotational Speed	7200 rpm
Logical Blocks	312,581,808
Power Source	
DC Power (Max)	Idle 1.0W, Active 3.25W
DC Current	5V (.8A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5^0C to 60^0C
Relative Humidity Range	10% to 90% 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

2.5” 250GB SATA 7200 RPM HDD	
Capacity (bytes)	250,059,350,016
Dimensions inches (W x D x H)	Approximately (3.93 x 2.75 x 0.374 inches)
Interface type and Maximum speed	Up to 3Gb/s
Internal buffer size	16 MB
Average Seek Time	12 ms (Read)
Rotational Speed	7200 rpm
Logical Blocks	488,397,168
Power Source	
DC Power (Max)	Idle 1.0W, Active 3.25W
DC Current	5V (.8A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5^0C to 60^0C
Relative Humidity Range	10% to 90% 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

2.5” 320GB SATA 7200 RPM HDD	
Capacity (bytes)	320,072,933,376
Dimensions inches (W x D x H)	Approximately (3.93 x 2.75 x 0.374 inches)
Interface type and Maximum speed	Up to 3Gb/s
Internal buffer size	16 MB
Average Seek Time	12 ms (Read)
Rotational Speed	7200 rpm

Logical Blocks	625,142,448
Power Source	
DC Power (Max)	Idle 1.0W, Active 3.25W
DC Current	5V (.8A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5^0C to 60^0C
Relative Humidity Range	10% to 90% 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

2.5" 64GB SATA Solid State HDD	
Capacity (bytes)	64,023,257,088
Dimensions inches (W x D x H)	2.106 x 3.059 x 0.134
Interface type and Maximum speed	SATA 3.0 Gbps
Internal buffer size	128 MB
Average Seek Time	NA
Rotational Speed	NA
Logical Blocks	125,045,424
Power Source	
DC Power (Max)	Idle 0.125W, Active 0.135W *Based on MobileMark 2007 scenario
DC Current	5.0V (0.35A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	0 to 70 C
Relative Humidity Range	10 to 90 %
Maximum Wet Bulb Temperature	29 C
Altitude Range	-200 to 5000 m

Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-55 to 95 C
Relative Humidity Range	5 to 95 %
Maximum Wet Bulb Temperature	38 C
Altitude Range	-200 to 10,600 m

2.5" 128GB Solid State SATA HDD	
Capacity (bytes)	128,035,676,160
Dimensions inches (W x D x H)	2.106 x 3.059 x 0.134
Interface type and Maximum speed	SATA 3.0 Gbps
Internal buffer size	128 MB
Average Seek Time	N/A
Rotational Speed	N/A
Logical Blocks	250,069,680
Power Source	
DC Power (Max)	Idle 0.112W, Active 0.125W * Based on MobileMark 2007 scenario
DC Current	3.3V (0.6A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	0 to 70 C
Relative Humidity Range	10 to 90 %
Maximum Wet Bulb Temperature	29 C
Altitude Range	-200 to 5000 m
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-55 to 95 C
Relative Humidity Range	0 C to 55 C / 90~98% RH
Maximum Wet Bulb Temperature	38 C
Altitude Range	-200 to 10,600 m

2.5" 250GB SATA Full Disk Encryption HDD	
Capacity (bytes)	250,059,350,016
Dimensions inches (W x D x H)	Approximately (3.93 x 2.75 x 0.374 inches)

Interface type and Maximum speed	Up to 3Gb/s
Internal buffer size	16 MB
Average Seek Time	12 ms (Read)
Rotational Speed	7200 rpm
Logical Blocks	488,397,168
Power Source	
DC Power (Max)	Idle 1.0W, Active 3.25W
DC Current	5V (.8A)
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5^0C to 60^0C
Relative Humidity Range	10% to 90% 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 and TB equals 1 trillion bytes; actual capacity varies with preloaded material and operating environment and will be less.

Optical Drives

DVD +/- RW[1]	**MT**	**DT**	**SFF**
External Dimensions inches/centimeters (With Bezel – W x H x D)	149mm(6in)/42mm (2in)/ 190.5 (max)	149mm(6in)/42mm (2in)/ 190.5 (max)	128.0 mm (5.04)/ 12.7mm (0.5 in)/ 126.1mm (4.97in)
Weight (max) pounds/kilograms	730g	730g	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	2MB	2MB	1MB
Access Times (typical)	(1/3 stroke) 130ms	(1/3 stroke) 130ms	(1/3 stroke) 150ms
Maximum Data Transfer Rates			
Writes	16x DVD/48x CD	16x DVD/48x CD	8x DVD/ 24x CD

DVD +/- RW[1]	MT	DT	SFF
Reads	16x DVD/48x CD	16x DVD/48x CD	8x DVD/ 24x CD
Power Source			
DC Power Requirements	12V, 5V	12V, 5V	5V
DC Current	1200mA (12V)/ 900mA (5V)	1200mA (12V)/ 900mA (5V)	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.

DVD-ROM	MT	DT	SFF
External Dimensions inches/centimeters (With Bezel – W x H x D)	149mm(6in)/42mm (2in)/ 190.5 (max)	149mm(6in)/42mm (2in)/ 190.5 (max)	128.0 mm (5.04)/ 12.7mm (0.5 in)/ 126.1mm (4.97in)
Weight (max) pounds/kilograms	730g	730g	165g
Interface type and speed	SATA 1.5Gbit/s	SATA 1.5Gbit/s	SATA 1.5Gbit/s
Disc Capacity	Standard	Standard	Standard
Internal buffer size	2MB	2MB	1MB
Access Times (typical)	(1/3 stroke) 130ms	(1/3 stroke) 130ms	(1/3 stroke) 150ms
Maximum Data Transfer Rates			
Writes	N/A	N/A	N/A
Reads	16x DVD/48x CD	16x DVD/48x CD	8x DVD/ 24x CD
Power Source			
DC Power Requirements	12V, 5V	12V, 5V	5V
DC Current	1200mA (12V)/ 900mA (5V)	1200mA (12V)/ 900mA (5V)	800mA
Environmental Operating Conditions (Non-Condensing):			

DVD-ROM	MT	DT	SFF
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 3048m	-200 to 3048m	-200 to 3048m
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] DVD-ROM drives may have write-capable hardware that has been disabled via firmware modifications.

DVD+/-RW with Blu-Ray-ROM	MT	DT	SFF
External Dimensions inches/centimeters (With Bezel – W x H x D)	149mm(6in)/42mm (2in)/ 190.5 (max)	149mm(6in)/42mm (2in)/ 190.5 (max)	128.0 mm (5.04)/ 12.7mm (0.5 in)/ 126.1mm (4.97in)
Weight (max) pounds/kilograms	830g	7830g	190g
Interface type and speed	SATA 1.5Gbit/s	SATA 1.5Gbit/s	SATA 1.5Gbit/s
Disc Capacity	Standard	Standard	Standard
Internal buffer size	4MB	4MB	2MB
Access Times (typical)	(1/3 stroke) 160ms	(1/3 stroke) 160ms	(1/3 stroke) 180ms
Maximum Data Transfer Rates			
Writes	16x DVD/ 40x CD	16x DVD/ 40x CD	8x DVD / 24x CD
Reads	6x BD/16x DVD/40x CD	6x BD/16x DVD/40x CD	4x BD/8x DVD/ 24x CD
Power Source			
DC Power Requirements	12V, 5V	12V, 5V	5V
DC Current	1200mA (12V)/ 900mA (5V)	1200mA (12V)/ 900mA (5V)	900mA
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 3048m	-200 to 3048m	-200 to 3048m
Environmental Non-Operating Conditions (Non-Condensing):			

DVD+/-RW with Blu-Ray-ROM	MT	DT	SFF
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

More details for optical drives can be found at:

http://support.dell.com/support/systemsinfo/documentation.aspx?c=us&l=en&s=gen&~cat=7

BIOS Defaults

BIOS Factory Defaults (All chassis unless noted)		
Drives	Diskette drive:	Enabled
	SATA Operation:	RAID On
	SMART Reporting:	Disabled
	Drives:	
	SATA-0:	Enabled
	SATA-1:	Enabled
	SATA-2:	Enabled
	SATA-3[1]:	Enabled
	External SATA:	Enabled
System Configuration	Integrated NIC:	Enabled
	USB Controller:	Enabled
	Parallel Port:	PS/2
	Parallel Port Address:	378h
	Serial Port #1:	Auto
	Miscellaneous Devices:	PS/2
	Front USB:	Enabled
	Rear Dual USB:	Enabled
	Audio:	Enabled
	Optiplex ON Reader:	Disabled
	Rear Quad USB:	Enabled
	PCI Slots	Enabled
	WiFi NIC Slot	Enabled
Video	Primary Video:	Auto
Performance	Multi Core Support:	Enabled
	Intel Turbo Boost Technology:	Enabled
	Intel SpeedStep:	Enabled
	C States Control:	Enabled
	Limit CPUID Value	Disabled
Virtualization Support	Virtualization:	Enabled

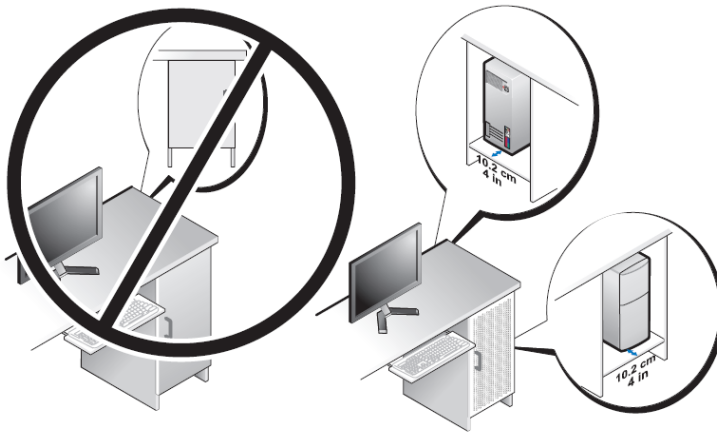
	VT for Direct I/O:	Disabled
	Trusted Execution:	Disabled
Security	Admin Password:	Not set.
	System Password:	Not set.
	Password Changes:	Enabled
	Password Configuration:	1 to 32 characters
	Strong Password:	Disabled
	TPM Security:	Disabled
	CPU XD Support:	Enabled
	Computrace:	Deactivate
	Chassis Intrusion:	On-Silent
	Stat-0 Password:	Not Set
Power Management	AC Recovery:	Power Off
	Auto On Time:	Disabled
	Low Power Mode:	Enabled
	Remote Wake Up:	Disabled
	Suspend Mode:	S3
	Fan Control Override:	Disabled
Maintenance	Service Tag:	Set by the factory.
	Asset Tag:	Set by the factory
	SERR Messages:	Enable
Image Server	Lookup Method:	DNS
	ImageServer IP:	255.255.255.255
	ImageServer Port:	06910
	Client DHCP:	DHCP
	Clent IP:	255.255.255.255
	Client SubnetMask	255.255.255.255
	`Client Gateway:	255.255.255.255.
	License Status:	No License (if license is not purchased)
Post Behavior	Fast Boot:	Enabled
	Numlock Key:	Enabled
	POST Hotkeys:	Enabled F12=Boot Menu
	Keyboard Errors:	Enabled
	MEBx Hotkey:	Enabled

[1] Only present on MT

Chassis Enclosure & Ventilation Requirements

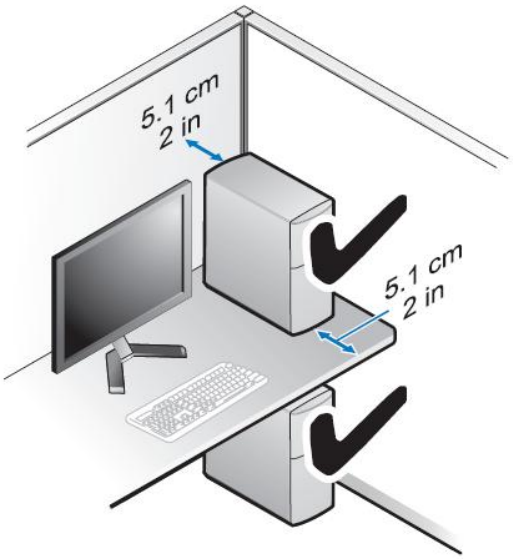
Enclosure Ventilation If your enclosure has doors, they need to be of a type that allows at least 30% airflow through the enclosure (front and back).

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.



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, Communication Devices relevant to this product, along with additional product related conformity assessment, and information encompassing Environmental, Energy Consumption, Noise Emissions, Product Materials Information, Packaging, Batteries, and Recycling relevant to this product may be viewed in the Regulatory and Environmental Datasheet for this product is located at: http://www.dell.com/content/topics/global.aspx/about_dell/values/regulatory_compliance/dec_conform?c=us&l=en&s=corp&~ck=anavml

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/earth by clicking the Design for Environment link on the webpage.

Acoustic Noise Emission Information

Optiplex 980 MT

Component	High-end Configuration	Typical Configuration	EcoKit Configuration
CPU	Quad Core i7 2.8 GHz	Dual Core i5 3.2 GHz	Dual Core i5 3.2 GHz
Memory	4 GB DDRIII 800 MHz	2 GB DDRIII 800 MHz	2 GB DDRIII 800 MHz
HDD (#, capacity)	320 GB 7200 RPM SATA x 2	160 GB 7200 RPM SATA	2.5" 160 GB 7200 RPM SATA
RMSD	DVD +/-RW	DVD +/-RW	DVD +/-RW
Graphics Adapter	NVidia GT230 1 GB	Integrated Adapter	Integrated Adapter

The Declared Noise Emission in accordance with ISO 9296 for the Dell Optiplex 980 MT is as follows[1]:
(all values L_{WAd} expressed in bels[2]; 1 bel=10 decibels, re 10^{-12} Watts; all values L_{pA} expressed in decibels[3], re $2x10^{-5}$ Pa)

Sound Power

Operating Mode	High-end Configuration Declared Sound Power (L_{WAd})	Typical Configuration Declared Sound Power (L_{WAd})	EcoKit Configuration Declared Sound Power (L_{WAd})
Idle	4.2	3.6	3.1
HDD Operating	4.2	3.6	3.0
ODD Operating	5.0	5.0	5.2
90% CPU	4.3	3.6	3.0

Sound Pressure at Operator Position

Operating Mode	High-end Configuration Sound Pressure at Operator Position (L_{pA})		Typical Configuration Sound Pressure at Operator Position (L_{pA})		EcoKit Configuration Sound Pressure at Operator Position (L_{pA})	
	Desktop	Desk side	Desktop	Desk side	Desktop	Desk side
Idle	33	26	27	21	22	18
HDD Operating	32	25	27	22	22	17
ODD Operating	43	36	44	41	44	38
90% CPU	33	26	26	20	22	18

[1] All tests are conducted according to ISO 7779 and declared according to ISO 9296 except 90% CPU. For this mode, the system CPU was stressed at 90% utilization with no other peripheral device actively seeking. This test mode is not specified in ISO 7779, but was measured using the same microphone distances and measurement techniques defined for the other reported operating modes.
[2] Declared Sound Power rounded to the nearest tenth of a bel per ISO 9296 section 4.4.2
[3] Declared Sound Pressure rounded to the nearest whole decibel per ISO 9296 section 4.4.4

Sound Pressure at Bystander Position

Operating Mode	High-end Configuration Sound Pressure at Bystander Position (L_{pA})		Typical Configuration Sound Pressure at Bystander Position (L_{pA})		EcoKit Configuration Sound Pressure at Bystander Position (L_{pA})	
	Desktop	Desk side	Desktop	Desk side	Desktop	Desk side
Idle	28	24	22	21	18	17
HDD Operating	27	24	23	21	19	17
ODD Operating	37	34	37	37	37	35
90% CPU	28	25	21	21	19	17

Optiplex 980 DT

Component	High-end Configuration	Typical Configuration	EcoKit Configuration
CPU	Quad Core i7 2.8 GHz	Dual Core i5 3.2 GHz	Dual Core i5 3.2 GHz
Memory	4 GB DDRIII 800 MHz	2 GB DDRIII 800 MHz	2 GB DDRIII 800 MHz
HDD (#, capacity)	320 GB 7200 RPM SATA	160 GB 7200 RPM SATA	2.5" 160 GB 7200 RPM SATA
RMSD	DVD +/-RW	DVD +/-RW	DVD +/-RW
Graphics Adapter	AMD Radeon HD3470 256MB	Integrated Adapter	Integrated Adapter

The Declared Noise Emission in accordance with ISO 9296 for the Dell Optiplex 980 MT is as follows[3]:
(all values L_{WAd} expressed in bels[4]; 1 bel=10 decibels, re 10^{-12} Watts; all values L_{pA} expressed in decibels[3], re $2x10^{-5}$ Pa)

Sound Power

[3] All tests are conducted according to IS 7779 and declared according to ISO 9296 except 90% CPU. For this mode, the system CPU was stressed at 90% utilization with no other peripheral device actively seeking. This test mode is not specified in ISO 7779, but was measured using the same microphone distances and measurement techniques defined for the other reported operating modes.
[4] Declared Sound Power rounded to the nearest tenth of a bel per ISO 9296 section 4.4.2
[3] Declared Sound Pressure rounded to the nearest whole decibel per ISO 9296 section 4.4.4

Operating Mode	High-end Configuration Declared Sound Power (L_{WAd})	Typical Configuration Declared Sound Power (L_{WAd})	EcoKit Configuration Declared Sound Power (L_{WAd})
Idle	3.7	3.4	3.1
HDD Operating	3.8	3.5	3.1
ODD Operating	5.1	5.1	5.1
90% CPU	4.2	3.4	3.1

Sound Pressure at Operator Position

Operating Mode	High-end Configuration Sound Pressure at Operator Position (L_{pA})		Typical Configuration Sound Pressure at Operator Position (L_{pA})		EcoKit Configuration Sound Pressure at Operator Position (L_{pA})	
	Desktop	Desk side	Desktop	Desk side	Desktop	Desk side
Idle	27	22	21	19	21	18
HDD Operating	27	21	21	20	22	19
ODD Operating	44	36	44	35	44	36
90% CPU	34	26	21	19	22	18

Sound Pressure at Bystander Position

Operating Mode	High-end Configuration Sound Pressure at Bystander Position (L_{pA})		Typical Configuration Sound Pressure at Bystander Position (L_{pA})		EcoKit Configuration Sound Pressure at Bystander Position (L_{pA})	
	Desktop	Desk side	Desktop	Desk side	Desktop	Desk side
Idle	23	21	20	19	19	18
HDD Operating	23	21	21	19	20	18
ODD Operating	37	33	37	33	37	34
90% CPU	28	24	21	19	20	18

Optiplex 980 SFF

Component	High-end Configuration	Typical Configuration	EcoKit Configuration
CPU	Quad Core i7 2.8 GHz	Dual Core i5 3.2 GHz	Dual Core i5 3.2 GHz
Memory	4 GB DDRIII 800 MHz	2 GB DDRIII 800 MHz	2 GB DDRIII 800 MHz
HDD (#, capacity)	320 GB 7200 RPM SATA	160 GB 7200 RPM SATA	2.5" 160 GB 7200 RPM SATA
RMSD	Slim DVD +/-RW	Slim DVD +/-RW	Slim DVD +/-RW
Graphics Adapter	AMD Radeon HD3470 256MB	Integrated Adapter	Integrated Adapter

The Declared Noise Emission in accordance with ISO 9296 for the Dell Optiplex 980 MT is as follows[5]:
(all values L_{WAd} expressed in bels[6]; 1 bel=10 decibels, re 10^{-12} Watts; all values L_{pA} expressed in decibels[3], re $2x10^{-5}$ Pa)

Sound Power

Operating Mode	High-end Configuration Declared Sound Power (L_{WAd})	Typical Configuration Declared Sound Power (L_{WAd})	EcoKit Configuration Declared Sound Power (L_{WAd})
Idle	3.9	3.5	3.0
HDD Operating	4.0	3.4	3.0
ODD Operating	4.8	4.8	4.8
90% CPU	4.6	3.4	3.1

Sound Pressure at Operator Position

Operating Mode	High-end Configuration Sound Pressure at Operator Position (L_{pA})	Typical Configuration Sound Pressure at Operator Position (L_{pA})	EcoKit Configuration Sound Pressure at Operator Position (L_{pA})

[5] All tests are conducted according to ISO 7779 and declared according to ISO 9296 except 90% CPU. For this mode, the system CPU was stressed at 90% utilization with no other peripheral device actively seeking. This test mode is not specified in ISO 7779, but was measured using the same microphone distances and measurement techniques defined for the other reported operating modes.
[6] Declared Sound Power rounded to the nearest tenth of a bel per ISO 9296 section 4.4.2
[3] Declared Sound Pressure rounded to the nearest whole decibel per ISO 9296 section 4.4.4

Idle	31	24	21
HDD Operating	31	24	21
ODD Operating	40	40	40
90% CPU	38	25	22

Sound Pressure at Bystander Position

Operating Mode	**High-end Configuration Sound Pressure at Bystander Position (L_{pA})**	**Typical Configuration Sound Pressure at Bystander Position (L_{pA})**	**EcoKit Configuration Sound Pressure at Bystander Position (L_{pA})**
Idle	25	21	18
HDD Operating	26	21	19
ODD Operating	35	34	35
90% CPU	33	21	19