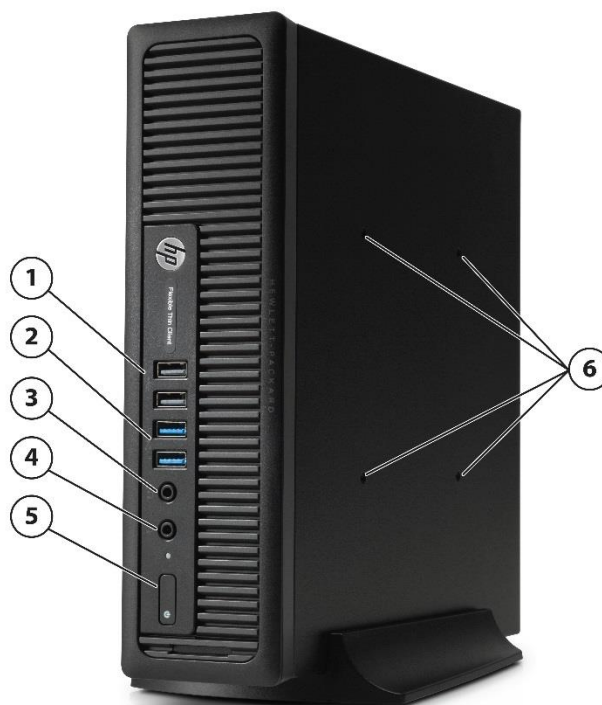


Standard Features and Configurable Components (availability may vary by country)

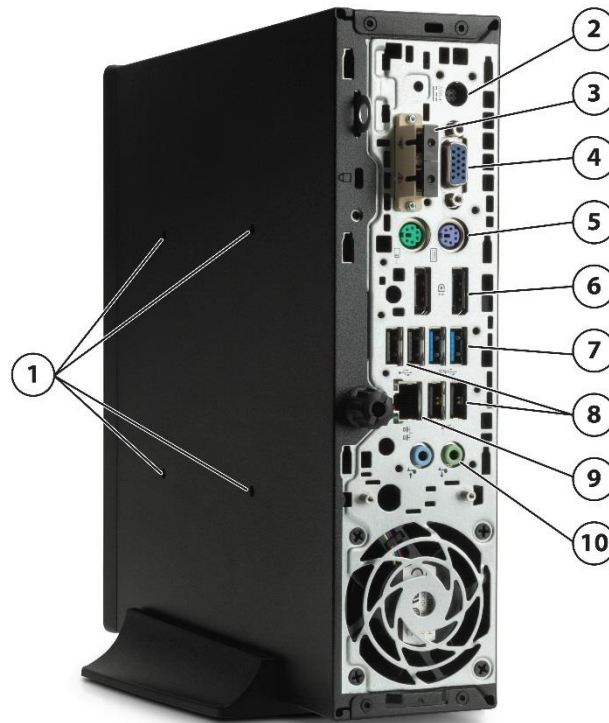
HP t820 Thin Client



Front View

- 1 USB 2.0 ports
- 2 USB 3.0 ports
- 3 Audio connector (microphone / headset out)
- 4 Audio connector (speaker / headset out)
- 4.5 Flash memory activity indicator light (not called-out in image above)
- 5 Power button (with integrated power indicator light)
- 6 Mounting points for HP Quick Release or other VESA mount

Standard Features and Configurable Components (availability may vary by country)



HP t820 Thin Client Rear View

- 1 VESA 100 Mounting System
- 2 Power in (from external power supply)
- 3 SC Fiber Network Connector (optional)
- 4 VGA analog video output
- 5 PS/2 keyboard and mouse connectors
- 6 DisplayPort 1.2 digital video outputs
- 7 USB 3.0 ports
- 8 USB 2.0 ports
- 9 Gigabit Ethernet RJ-45 port
- 10 Audio connectors (line in / line out)

Standard Features and Configurable Components (availability may vary by country)

At A Glance

Hardware features:

- Powerful 4th generation Intel CPUs for handling the most demanding client virtualization environments (Citrix HDX including HDX 3D Pro, VMware Horizon View, and Microsoft Remote FX)
- Intel Q87 Express chipset supporting Intel 4th generation Core processors, featuring integrated Intel HD 4600 Graphics and vPro Technology (available with select processors)
- The HP t820 Thin Client supports up to three monitors when configured with an Intel Core i5 CPU and utilizing the on-board Intel® HD 4600 Graphics card with 1 x VGA and 2 x DisplayPort connectors
- Optional 802.11 a/b/g/n Wi-Fi Network Adapter with dual internal antennas for enterprise-class performance and wireless connectivity
- Security features: TCG certified TPM chipset, BIOS designed to address NIST SP 800-147 guidelines, cable lock slot, lockable rear port cover option, case intrusion detection option, and Intel vPro/SIPP capabilities with Core i5 CPU. HP developed and engineered UEFI BIOS for enhanced security, manageability and software image stability
- Integrated Intel i217LM Gigabit Ethernet interface (RJ-45)
- DDR3-1600 Synchronous Dynamic Random Access Memory (SDRAM)
- Dual digital display support via dual integrated DisplayPort 1.2 ports
- 87% efficient energy saving external power adapter
- ENERGY STAR® qualified models certified EPEAT® Gold
- Design for Environment standards
- Low halogen design*
- Protected by HP Services, including standard warranties up to 3-3-3 (terms and conditions vary by country; certain restrictions and exclusions apply)
- Tool-less serviceability features for easier upgrades and repairs
- All models TAA compliant (in North America & EMEA)

* This product is low halogen except for power cords, cables and peripherals. Service parts obtained after purchase may not be Low Halogen.

Software features for Genuine Windows Embedded Standard 7E (WES 7E):

- Microsoft® WES 7E with support for RemoteFX and local applications, providing a richer user experience
- Internet Explorer 10 (IE10) for genuine Internet Explorer browsing and Web-application interfaces
- Excellent rich multimedia experience and enhanced USB device support in VDI environments
- Latest protocol support from Citrix On-Line Plug in (ICA) 4.1, RDP 8.1 w/RemoteFX, and VMware Horizon Client 2.3.3
- Enhanced Write Filter and File-Based Write Filter provide complete flexibility to protect the entire Flash drive, or configure areas of the disk for persistent access by local applications
- Microsoft Firewall for enhanced data security
- Support 802.1x LAN-based authentication for greater security
- HP Universal Print Driver provides instant access to a range of HP print devices without downloading separate drivers.
- Integrated 802.11a/b/g/N with dual internal antennas configurations available
- Standard configurations:
 - HP t820 standard chassis – 16 GB or greater Flash drive and 4 GB RAM
- Improved end user experience with HP Velocity
 - Enables IT managers to monitor network activity and optimize end-user experience
 - Intelligently reduces network retransmissions due to packet loss, providing a better user experience
 - Built in monitors enable remote debugging and troubleshooting.
 - Available only on HP thin clients.
 - For details visit: <http://www.hp.com/go/velocity>



Standard Features and Configurable Components (availability may vary by country)

Software features for Genuine Windows Embedded Standard 7P (WES 7P):

In addition to the software features in WES 7E:

- A 64-bit OS for improved performance and support for larger memory installations (up to 16 GB)
- Windows Touch (Multi-touch support) for touch-screen monitors
- Multi-language support brings multilingual capabilities letting users select a preferred display language, or to easily install a number of other languages
- DirectAccess feature allows remote users to securely access enterprise shares, websites, and applications without connecting to VPN
- BrancheCache WAN optimization technology
- AppLocker application “whitelisting”
- AntiMalware and Windows Defender software providing additional protection from virus, worms, and spyware
- Snipping tool for easy screen capture copying and pasting
- Remote media streaming to enhance multimedia user experience
- Photo Viewer for easy image viewing
- Improved end user experience with HP Velocity
 - Enables IT managers to monitor network activity and optimize end-user experience
 - Intelligently reduces network retransmissions due to packet loss, providing a better user experience
 - Built in monitors enable remote debugging and troubleshooting.
 - Available only on HP thin clients.
 - For details visit: <http://www.hp.com/go/velocity>

Software features for Genuine Windows Embedded 8 Standard (WE 8S):

- The newest Microsoft embedded software based on Windows 8
- A 64-bit OS for improved performance and support for larger memory installations (up to 16 GB)
- Smooth, immersive experiences with technologies like advanced Multi Touch and Windows 8 applications
- The latest RDP8 and Remote FX client software
- WES8 offers a secure platform that is intelligent systems ready
- Latest Internet Explorer 10 (IE10) for genuine Internet Explorer browsing, HTML 5 support and Web-application interfaces
- Latest protocol support from Citrix, VMware and RDP
- Excellent rich multimedia experience and enhanced USB device support in VDI environments
- Integrated 802.11a/b/g/N with dual internal antennas configurations available
- Standard configurations: 16 GB Flash drive and 4 GB RAM
- Improved end user experience with HP Velocity
 - Enables IT managers to monitor network activity and optimize end-user experience
 - Intelligently reduces network retransmissions due to packet loss, providing a better user experience
 - Built in monitors enable remote debugging and troubleshooting.
 - Available only on HP thin clients.
 - For details visit: <http://www.hp.com/go/velocity>

All Windows Embedded 8 devices must be activated. Customers have the option via Internet connection, telephone, or indirectly through a proxy for large deployments.

OPERATING SYSTEMS

Preinstalled

- Windows Embedded Standard 7E (32-bit)
- Windows Embedded Standard 7P (64-bit)
- Windows Embedded 8 Standard (64-bit)



Standard Features and Configurable Components (availability may vary by country)

CHIPSET

Intel® Q87 Express

PROCESSOR

Intel® Core™ i7-4770S Processor

Up to 3.9 GHz maximum turbo frequency (3.1 GHz base frequency)

8 MB cache, 4 cores, 4 threads

Intel Graphics HD 4600

Supports Intel vPro Technologies and Intel's Stable Image Platform Program (SIPP), Virtualization technology (VT-x), and Virtualization for directed I/O (VT-d)

Intel® Core™ i5-4570S Processor

Up to 3.6 GHz maximum turbo frequency (2.9 GHz base frequency)

6 MB cache, 4 cores, 4 threads

Intel Graphics HD 4600

Supports Intel vPro Technologies and Intel's Stable Image Platform Program (SIPP), Virtualization technology (VT-x), and Virtualization for directed I/O (VT-d)

Intel® Pentium® G3220 Processor

3.0 GHz base frequency

3 MB cache, 2 cores, 2 threads

Intel Graphics HD

Intel® Pentium® G3240 Processor

3.1 GHz base frequency

3 MB cache, 2 cores, 2 threads

Intel Graphics HD

GRAPHICS

Integrated on all models (depends on processor)

Intel Graphics 4600

NOTE: When the HP t820 model configuration includes an Intel Core i5 processor but not a discrete MXM graphics card, all three monitor ports are driven by the processor's integrated graphics engine. When the model is configured with an Intel Pentium only 2 of the 3 graphics display ports are active. Due to a limitation with the Intel integrated graphics, when a DisplayPort to DVI or HDMI adapter is installed, the VGA port will not be active.

Optional Discrete Graphics Solutions

AMD Radeon HD 7650A (MXM)

NOTE: When this MXM graphics card is installed in the USDT all three monitor ports are active. The integrated processor graphics will operate the top DisplayPort while the discrete ATI graphics will operate the bottom Multi-Stream DisplayPort and the VGA output.

Adapters and Cables

DisplayPort to DVI-D Adapter

DisplayPort to HDMI Adapter

DisplayPort to VGA Adapter

STORAGE

Flash memory modules



Standard Features and Configurable Components (availability may vary by country)

16 GB MLC flash memory; mSATA connector

32 GB MLC flash memory; mSATA connector

MEMORY

Type	Maximum	# of Slots
DDR3 non-ECC Up to 1600 MT/s	16 GB	2 SODIMM

NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

NETWORKING/COMMUNICATIONS

Ethernet (RJ-45)

Intel I217LM Gigabit Network Connection (standard)

Wireless

Intel Centrino Advanced-N 6205 802.11 a/b/g/n PCI Express Mini Card Wireless Network Connection (optional)

NOTE: Either the integrated network connection or the Intel Centrino wireless NIC is required to support Intel vPro Technology features.

AUDIO/MULTIMEDIA

HD audio with Realtek ALC221 codec (all ports are stereo)

Microphone* and headphone front ports (3.5mm)

Line-out and Line-In rear Ports* (3.5mm)

Multi-streaming capable*

Internal Speaker (standard)

* The front microphone port is re-taskable as a Line-in, Microphone-in or Headphone-out port. Rear audio input ports are re-taskable as a Line-in or Microphone-in port. External speakers must be powered externally. Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks. This allows for different audio applications to use separate audio ports on the system. For example, the front jacks could be used with a headset for a communications application while the rear jacks are being used with external speakers and a multimedia application.

KEYBOARDS AND POINTING DEVICES

Keyboard

HP PS/2 Keyboard

HP USB Keyboard

USB Smart Card (CCID) Keyboard

HP Wireless Keyboard and Mouse Combo

Mice

PS/2 Optical Mouse

USB Optical Mouse

USB Laser Mouse



Standard Features and Configurable Components (availability may vary by country)

HP BIOS

Key features of the HP BIOS include:

- Deployment and manageability – HP BIOS provides several technologies that help integrate the HP t820 Flexible Thin Client into the enterprise, such as PXE, remote configuration, remote control, and F10 Setup support for 12 languages.
- Select models feature either Intel Standard Manageability or Intel Core vPro Processor Technology.
- Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- UEFI specification 2.1
- Thermal and power management – The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP t820 Thin Client in any enterprise environment.
- Acoustic performance – Industry leading acoustic emissions across the range of operating conditions.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.

Additional HP BIOS Features

- Power-On password – Helps prevent an unauthorized user from powering on the system.
- Administrator password – Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS.

S5 Max Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 1W in S5 (when turned off). When S5 Max Power Savings feature is enabled power to slots is turned off along with WOL functionality.

SECURITY

Trusted Platform Module (TPM) 1.2
SATA port disablement (via BIOS)
USB enable/disable (via BIOS)
Removable media write/boot control
Power-On password (via BIOS)
Setup password (via BIOS)
Hood Sensor (case intrusion detection)
Solenoid lock support
Support for chassis padlocks and cable lock devices

POWER

Power Supply

High efficiency	Integrated graphics:	135 W active PFC 87% efficient
	Discrete graphics:	180 W active PFC 87% efficient

ENVIRONMENTAL & REGULATORY

ENERGY STAR® qualified models available

EPEAT® registered where applicable/supported. See www.epeat.net for registration status by country.

Low halogen* (chassis, all internal components and modules)



Standard Features and Configurable Components (availability may vary by country)

TAA compliant (In US)

* This product is low halogen except for power cords, cables and peripherals. Service parts obtained after purchase may not be Low Halogen.

PORTS

I/O Ports – Standard

USB 2.0	2 (front) 4 (rear)
USB 3.0	2 (front) 2 (rear)
Serial (RS-232)	N/A
PS/2	1 keyboard (purple) 1 mouse (green)
Video	1 VGA 2 DisplayPort with multi-stream NOTE: When configured with an Intel Pentium only two of the available video output ports are active.
Audio	Front: headphone/mic Rear: line in/out 3.5mm diameter
RJ-45 Network Interface	1

SLOTS

PCI Express Mini Card	1 each
MXM Graphics	1 each
mSATA	1 each

SERVICE AND SUPPORT

On-site Warranty 1: Three-year (3-3-3) limited warranty delivers three years of on-site, next business day 2 service for parts and labor and includes free telephone support 3 24 x 7. Three-year onsite and labor are not available in all countries. Service offers terms up to 5 years by choosing a Care Pack. To choose the right level of service for your HP product, visit HP Care Pack Central: www.hp.com/go/cpc

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region.

NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

NOTE 3: Technical telephone support applies only to HP-configured and third-party HP qualified hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.



Technical Specifications – Operating Systems, Software and eDocumentation

SOFTWARE for HP t820

Windows Embedded Standard				
Host Environment	Protocol	8S	7E	7P
Microsoft Remote Desktop Services	RemoteFX (RFX)	✓	✓	✓
	RDP	✓	✓	✓
Citrix	ICA	✓	✓	✓
	HDX	✓	✓	✓
VMware Horizon View	RDP	✓	✓	✓
	PCoIP	✓	✓	✓
Windows Embedded Standard				
Protocol Clients		8S	7E	7P
Citrix Receiver (Standard)		4.1	4.1	4.1
VMware View Client (CART)		2.3	2.3	2.3
HP Remote Graphics Software (HP RGS)		6.0	6.0	6.0
Remote Desktop Protocol		8.1	8.1	8.1
HP TeamTalk Terminal Emulator		via add-on	via add-on	via add-on
Windows Embedded Standard				
Browser Support		8S	7E	7P
Internet Explorer		10	10	10
Windows Embedded Standard				
Security		8S	7E	7P
Smart Card		✓	✓	✓
Logon Manager		✓	✓	✓
Read Only Operating System		✓	✓	✓
802.1x		✓	✓	✓
Enhanced Write Filter (EWF) File-Based Write Filter (FBWF) Unified Write Filter (UWF)		UWF	EWF FBWF	EWF FBWF
Microsoft Firewall		✓	✓	✓
Windows Embedded Standard				
Session brokers		8S	7E	7P
Citrix XenDesktop		✓	✓	✓
VMware Horizon View		2.3	2.3	2.3
Windows Embedded Standard				
Management Tools		8S	7E	7P
HP Device Manager		✓	✓	✓
HP ThinState		✓	✓	✓
HP Easy Tools		via add-on	via add-on	via add-on
Microsoft SCCM/EDM agent			✓	✓
Windows Embedded Standard				
Additional Components		8S	7E	7P
HP Velocity		✓	✓	✓
HP Cloud Connection Manager		✓	✓	✓



Technical Specifications – Operating Systems, Software and eDocumentation

HP ThinShell	✓	✓	✓
Universal Print Driver	✓	✓	✓
Windows Media Player	12	12	12
Windows Touch (Multi-touch support)	✓ (advanced)		✓ (multi)
Multilanguage support	✓		✓
Microsoft DirectAccess	via VL*		✓
Microsoft BranchCache			✓
Microsoft AppLocker			✓
Microsoft AntiMalware & Windows Defender	✓		✓
Windows Embedded Standard			
Audio CODECs included	8S	7E	7P
MP3	✓	✓	✓
WMA stereo	✓	✓	✓
Microsoft AC3 encoder	✓	✓	✓
Microsoft Dolby audio decoder (AC-3, E-AC-3)	✓	✓	✓
Windows Embedded Standard			
Video CODECs included	8S	7E	7P
MPEG-1	✓	✓	✓
MPEG-4 part 2 (DivX, Xvid, H.263)	✓	✓	✓
MPEG-4 part 10 (H.264, AVC)	✓	✓	✓
WMV 7/8/9/ VC-1 & ASF Demuxer	✓	✓	✓

***NOTE:** These features are included in the Windows Embedded 8 Standard image, but they are disabled. To unlock these features, the “Windows Embedded 8 Standard Enterprise Kit” must be purchased through Microsoft volume licensing.

NOTE: Other add-on software available (see: <http://www.hp.com/support> for latest list of available add-ons). Software performance and support may vary depending on customer environment and backend.

Technical Specifications – Core vPro Processors

INTEL 4th GENERATION CORE vPRO PROCESSORS

All HP t820 Flexible Series Thin Client models featuring this technology include processors that are part of the Intel 2013 Stable Image Platform Program (SIPP) designed to ensure the stability promise inherent in the value proposition of the HP t820 Flexible Thin Client, thus making these models the most stable, secure, and manageable platforms available to enterprises today.

Intel® Advanced Management Technology (AMT) v9.0 – An advanced set of remote management features and functionality which provides network administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 9.0 includes the following advanced management functions:

- Power Management (on, off, reset)
- Hardware Inventory (includes BIOS and firmware revisions)
- Hardware Alerting
- Agent Presence
- System Defense Filters
- SOL/IDER
- Cisco NAC/SDN Support
- ME Wake-on-LAN
- DASH 1.1 compliance
- IPv6 Support
- Fast Call for Help - a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection
- Remote Scheduled Maintenance - pre-schedule when the PC connects to the IT or service provider console for maintenance. Remote PCs can get required patches, be inventoried, etc by connecting to their IT console or Service Provider when it's convenient.
- Remote Alerts - automatically alert IT or service provider if issues arise
- Access Monitor - Provides oversight into Intel® AMT actions to support security requirements
- PC Alarm Clock
- Microsoft NAP Support
- Host Base set-up and configuration
- Management Engine (ME) firmware roll back
- Wireless AMT functionality on Desktop (WoDT)
- Enhanced KVM resolution



Technical Specifications - Communications

Intel HD Graphics		
VGA Controller	Integrated	
DisplayPort	Multimode capable; supports HDCP, Display Port Audio (2 streams), HBR2 link rates and Multi-Stream Technology for a maximum of 3 displays	
Bus Type	N/A	
RAMDAC	N/A	
Memory	<p>Intel graphics do not have dedicated memory but utilize some of the computer's system memory. The amount of memory used for graphics depends on the amount of system memory installed, BIOS settings, operating system, and system load. 32 MB is pre-allocated for graphics use at system boot time. Additional memory can be allocated at boot time by the BIOS for PAVP (Protected Audio Video Playback) support for playback of protected video content.</p> <p>Additional memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (DVMT), to provide an optimal balance between graphics and system memory use.</p>	
Maximum Graphics Memory	Microsoft Windows 7	Windows 8
	Up to 1.7GB	Up to 1.8GB
	Note: the actual amount of maximum graphics memory can be less than the amounts listed above depending upon your computer's configuration.	
Maximum Color Depth	32 bits/pixel	
Graphics/Video API Support	<p>4th Generation Core processors:</p> <ul style="list-style-type: none"> • The Processor Graphics contains a refresh of the seventh generation graphics core enabling substantial gains in performance and lower power consumption. Up to 16 EU support. • Next Generation Intel Clear Video Technology HD Support is a collection of video playback and enhancement features that improve the end user's viewing experience <ul style="list-style-type: none"> ○ Encode/transcode HD content ○ Playback of high definition content including Blu-ray Disc ○ Superior image quality with sharper, more colorful images • DirectX Video Acceleration (DXVA) support for accelerating video processing <ul style="list-style-type: none"> ○ Full AVC/VC1/MPEG2 HW Decode • Advanced Scheduler 2.0, 1.0 • DirectX 11.1 • OpenGL 4.0 • Open CL 1.2 	
Supported Display Resolutions and Refresh Rates		
Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP		
	Resolution	Refresh Rates
	800x600	60 Hz
	1024x768	60 Hz
	1152x864	60 Hz



Technical Specifications - Communications

1280x600	60 Hz
1280x720	60 Hz
1280x800	60 Hz
1280x960	60 Hz
1280x1024	60 Hz
1360x768	60 Hz
1366x768	60 Hz
1400x1050	60 Hz
1440x900	60 Hz
1600x900	60 Hz
1600x1200*	60 Hz
1680x1050	60 Hz
1920x1080	60 Hz
1920x1200*	60 Hz
1920x1440*	60 Hz
2560x1440*	60 Hz
2560x1600*	60 Hz

* Only supported on displays connected to the external DisplayPort connectors.

AMD Radeon HD 7650A Graphics Card

Form Factor	MXM 3.0
Graphics Controller	AMD Radeon HD 7650A
Output Connector	DisplayPort output through on-board DisplayPort connector
Core Clock	600MHz
Memory Clock	800MHz
Memory	2GB, DDR3, 128-bit wide
Max. Power	35W
HDCP Support	Yes
Supported Graphics APIs	DX11, OpenGL 4.1
Display Support	Maximum number of simultaneous displays: 3 DisplayPort Multistreaming and HBR2 supported. DisplayPort Audio supported for one audio stream

Supported Display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as they may not have been tested and qualified by HP.

Resolution	Maximum Refresh Rate (Hz)	
	Analog Connection	DisplayPort Connection
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60



Technical Specifications - Communications

1920x1200	85	60
1920x1440	85	60
2048x1536	75	60
2560x1440	N/A	60
2560x1600	N/A	60



Technical Specifications – Memory

System Memory Support

The HP t820 Flexible Series Thin Client supports the 4th generation Intel® Core™ processor family. Based on a new PC micro-architecture, the processor is designed for a two-chip platform consisting of a processor and Platform Controller Hub (PCH). Unlike previous generations, the processor includes an integrated memory controller (IMC). The IMC supports DDR3 protocols with two independent, 64-bit wide channels each accessing one or two DIMMs.

- Two channels of DDR3 unbuffered small outline dual in-line memory modules (SO-DIMM) with a maximum of two DIMMs per channel
- Single-channel and dual-channel memory organization modes
- Data burst length of eight for all memory organization modes
- DDR3 memory data transfer rates of up to 1600 MT/s; actual supported DDR3 data transfer rate determined by the configured processor.
- 64-bit wide channels
- DDR3 system memory I/O voltage of 1.5V
- Theoretical Maximum Memory Bandwidth:
 - 10.6 GB/s in single-channel mode or 21.3 GB/s in dual-channel mode assuming DDR3 1333 MT/s
 - 12.8 GB/s in single-channel mode or 25.6 GB/s in dual-channel mode assuming DDR3 1600 MT/s
 - 32 GB maximum memory support depending upon available number of DIMM sockets
- DDR3-1600 (PC3-12800) SODIMMs

CAUTION: You must shut down the computer and disconnect the power cord before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged in to an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

Memory Configurations

Slot 1 is black and must always be populated. Not all memory configurations possible are represented below.

NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

Total Memory	Socket	
	Channel A (black)	Channel B (black)
4 GB (dual channel)	2 GB	2 GB
8 GB (dual channel)	4 GB	4 GB
16 GB (dual channel)	8 GB	8 GB



Technical Specifications – Networking and Communications

Intel® I217LM GbE Network Connection (integrated)

Connector	RJ-45
System Interface	Integrated on PCA
Controller	Intel I217LM GbE platform LAN connect networking controller
Memory	24 KB FIFO packet buffer memory
Data rates supported	10/100/1000 Mbps
	802.1P
	802.1Q
	802.2
IEEE Compliance	802.3
	802.3ab
	802.3az
	802.3u
Bus architecture	PCI Express and SMBus
Data transfer mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
Power requirement	Requires 3.3V and 0.9V or just 3.3V with integrated regulators Power consumption 0.733 Watts
Boot ROM support	Yes
Network transfer mode	Full-duplex
	Half-duplex (not supported for the 1000BASE-T transceiver)
Network transfer rate	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
Environmental	Operating Temperature: 0° to 85° C
	Operating Humidity: 60% RH
Management	WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostic
Alerting	ASF 2.0 support; AMT 9.0 support

Intel Centrino Advance-N 6205 Wireless Network Interface Connection

Wireless LAN Standards	IEEE 802.11a/b/g/n IEEE 802.11 e, 802.11i, 802.11d, 802.11d, 802.11h
Interoperability	Wi-Fi certified (802.11 a/b/g/n WMM, WPA, WPA2 and WPS) Tested with wireless access points from several major manufacturers OS compatible with Microsoft Windows, Win7 and XP Cisco Compatible Extensions Program compliant (802.11a/b/g only) with Microsoft Windows XP and Windows 7
Frequency Band	2.4 GHz and 5 GHz
Antenna Structure	2 transmit; 2 receive (2x2)
Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: 66 possible data rates, ranging from 6 Mbps to 300 Mbps, depending on the combination of Bandwidth, Modulation Coding Scheme, and Guard Interval used, as defined in IEEE 802.11n specification
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM



Technical Specifications – Networking and Communications

Security	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES (support for key sizes of 128bits), TKIP, 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP, MSCHAP, PEAP-MSCHAPv2, LEAP, EAP-FAST, EAP-SIM, EAP-AKA PAP, CHAP, TLS, GTC	
	Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4) with Microsoft Windows XP only.	
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.	
Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK	
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required) Intel® My Wifi Technology (iPAN)	
Roaming	Provide seamless roaming between like access points (same frequency band)	
Output Power (for CCK)	15 dBm	
Output Power (for OFDM; power varies by data rate)	15 dBm	
Power Consumption	Transmit: 2.3 Watts (average, with one spatial streams) Receive: 1.9 Watts (average with two receive chains) Idle mode: 30mW – 40mW (average) Radio off: 20 mW (max)	
Power Management	ACPI compliant power management 802.11 compliant power saving mode	
Antenna Connections	3 U.FL type connectors, 50 ohm nominal impedance	
Range	802.11 a - Typical (@6 Mbps)	600 feet - Outdoor Open Area 150 feet - Indoor, Office environment
	802.11 b - Typical (@1 Mbps)	1200 feet - Outdoor Open Area 300 feet - Indoor, Office environment
	802.11 g - Typical (@1 Mbps)	1200 feet - Outdoor Open Area 300 feet - Indoor, Office environment
Form Factors	USDT:	MiniPCI-Express
	CMIT & SFF:	PCIe
Weight	0.013 lb (4.0 g)	
Dimensions	1.1 x 1.2 in (26.8 x 30.0 mm)	
Operating Voltage	3.3V +/- 9%, 1.5V +/- 5%	
Temperature	Operating:	32° to 176° F (0° to 80° C)
	Non-operating:	-40° to 176° F (-40° to 80° C)
Humidity	Operating:	10% to 90% (non-condensing)
	Non-operating:	5% to 90% (non-condensing)
	Microsoft Windows XP	Microsoft Windows Win 7
Configuration Utility	<ul style="list-style-type: none"> Microsoft Windows XP Wireless Network Connection Manager Intel PROSet for Microsoft Windows XP (required for Cisco Compatible Extensions support) 	Intel IHV extensions for Win7 available to support Cisco Compatible Extensions



Technical Specifications - Audio

High Definition Audio

Type	Integrated
HD Stereo Codec	Realtek 2-channel ALC221 codec
Audio I/O Ports	Front microphone-In (150-K ohm Input Impedance) Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver) Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load) Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load) Front Microphone/Headphone jack is re-task able to provide Microphone input, line-in or Headphone output to support connecting two headphones to the front of the system. When configured as a second front headphone output, both front headphone outputs are always driven with the same signal. All ports are 3.5mm
Internal Speaker Amplifier	1.5W amplifier for the internal speaker only. External speakers must be powered externally. Rear Line-in audio port is re-taskable as either Line-in or Microphone-In.
Multi-streaming Capable	Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Sampling	8 kHz - 192 kHz
Wavetable Syntheses	Yes – Uses OS soft wavetable
Analog Audio	Yes
# of Channels on Line-Out	Stereo (Left & Right channels)
Internal Speaker	Yes
External Speaker Jack	Yes



Technical Specifications – Power

Unit Environment and Operating Conditions

General Unit Operating Guidelines

- Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range.
- Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.
- Never restrict airflow into the computer by blocking any vents or air intakes.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: -22° to 140° F(-30° to 60° C)
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)

*Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

Power Supply

Standard Efficiency	N/A
High Efficiency*	Integrated graphics: 135W active PFC 87% efficient Discrete graphics: 180W active PFC 87% efficient
Operating Voltage Range	90 - 264 VAC
Rated Voltage Range	100 - 240 VAC
Rated Line Frequency	50/60 Hz
Operating Line Frequency Range	47 – 63 Hz
Rated Input Current	N/A
Rated Input Current with Energy Efficient* Power Supply	135W: 2.4A 180W: 2.9A
Current Leakage (NFPA 99)	< 250 µA
External Power Adapter	
Dimensions	6.7 x 2.6 x 1.5 in
Total Cord Length	12 ft 8 in

*High efficiency power supply is a requirement for ENERGY STAR qualification in conjunction with a select range of processors and modules



Technical Specifications – Weights & Dimensions

Weights & Dimensions

(configured with 1 HDD & 1 ODD)

Chassis (H x W x D)	2.6 x 9.9 x 10 in 66 x 252 x 254 mm
System Volume	257.5 cu in 4.22 L
System Weight*	6.8 lb 3.1 kg
Max Supported Weight (desktop orientation)	77.0 lb 35.0 kg
Tower Stand (H x W x D)	1.1 x 4.9 x 6.7 in 27 x 125 x 170 mm
Packaging (H x W x D)	8.6 x 15.7 x 19.7 in 218 x 398 x 500 mm
Shipping Weight*	14.77 lb 6.7 kg
Palletization Profile	6-units per layer 10-layer max. 60-units per pallet



Technical Specifications – Miscellaneous Features

Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED Explanation Table:
 - Number of 1-second red LED blinks followed by a 2-second pause, then repeats:
 - 2 - processor thermal protection activated
 - 3 - processor not installed
 - 4 - power supply failure
 - 5 -- memory error
 - 6 - video error
 - 7 - PCA failure (ROM detected failure prior to video)
 - 8 - invalid ROM, boot block recovery mode
 - 9 - system not fetching code
 - 10 - system hang while loading an option ROM
- HP PC Hardware Diagnostics UEFI:
 - This utility enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support
- System/Emergency ROM
- Flash ROM
- CMOS Battery Holder for easy replacement
- Flash Recovery with Video Configuration Record Software
- One Aux Power LED on System PCA
- Processor ZIF Socket for easy Upgrade
- Over-Temp Warning on Screen (Requires IM Agents)
- Clear Password Jumper
- DIMM Connectors for easy Upgrade
- Clear CMOS Button
- NIC LEDs (integrated) (Green & Amber)
- Dual Color Power and HD LED - To Indicate Normal Operations and Fault Conditions
- Color coordinated cables and connectors
- Tool-less Hood Removal
- Front power switch
- System memory can be upgraded without removing the system board or any internal components
- Tool-less Hard Drive, CD & Diskette Removal
- Green Pull Tabs, and Quick Release Latches for easy Identification

Additional Features

Towerable Orientation

Description

Product can be oriented as either a desktop or a tower



Technical Specifications - Environmental Data

Environmental Data **Eco-Label Certifications & declarations** This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- US ENERGY STAR®
- IT ECO Declaration
- EPEAT <Gold> registered in the United States. See <http://www.epeat.net> for registration status in your country.

Energy Consumption (in accordance with US ENERGY STAR® test method)

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 60Hz
Normal Operation	17.25 W	18.01 W	17.24 W
Sleep	3.85 W	4.12 W	3.93 W
Off	3.27 W	3.49 W	3.31 W

Heat Dissipation*

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 60Hz
Normal Operation	59 BTU/hr	62 BTU/hr	59 BTU/hr
Sleep	13 BTU/hr	14 BTU/hr	13 BTU/hr
Off	11 BTU/hr	12 BTU/hr	11 BTU/hr

* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive -2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the <gold> level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 12.3% post-consumer recycled plastic (by wt.)
- This product is 96.1% recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	1526.2 g
Internal:	PLASTIC/Polyethylene low density	177 g

RoHS Compliance

Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. By July 1, 2006, RoHS substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an



Technical Specifications - Environmental Data

Material Usage

exemption under the EU RoHS Directive).

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at: http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life Management and Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to:



Technical Specifications - Environmental Data

Hewlett-Packard Corporate Environmental Information

<http://www.hp.com/go/reuse-recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: <http://www.hp.com/go/recyclers>. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

For more information about HP's commitment to the environment:

Global Citizenship Report

<http://www.hp.com/hpinfo/globalcitizenship/qcreport/index.html>

Eco-label certifications

<http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html>

ISO 14001 certificates:

<http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html>



After-Market Options (availability may vary by region)

Graphics Solutions

	Part Number
HP DisplayPort To Dual Link DVI-D Adapter	NR078AA
HP DisplayPort To DVI-D Adapter	FH973AA
HP DisplayPort to HDMI Adapter	BP937AA
HP DisplayPort to VGA Adapter	AS615AA

Input Devices

	Part Number
HP USB Keyboard	QY776AA
HP USB Gray Keyboard	B6B64AA
HP USB Smart Card (CCID) Keyboard	BV813AA
HP USB Keyboard and Mouse Kit	B1T09AA
HP USB Washable Keyboard	VF097AA
HP USB and PS/2 Washable Mouse	BM866AA
HP USB and PS/2 Washable Keyboard and Mouse Kit	BV207AA
HP PS/2 Mouse	QY775AA
HP USB Mouse	QY777AA
HP USB 1000dpi Laser Mouse	QY778AA
HP Wireless Keyboard and Mouse Combination	QY449AA

System Memory

	Part Number
4GB DDR3-1600 SODIMM	B4U39AA
8GB DDR3-1600 SODIMM	B4U40AA

Security Devices

	Part Number
HP USDT Rear Port Controller Cover	VN571AA
HP Solenoid Lock and Hood Sensor (USDT/SFF)	E0X97AA
HP UltraSlim Cable Lock	H4D73AA

Stands and Accessories

	Part Number
HP USDT Tower Stand	QP897AA



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April 2014



Summary of changes

Date of change:	Version History:		Description of change:
April 14, 2014	V8 April 14, 2014	Changed	Styles
		Added	IDPubNumber
		Removed	
October 24, 2014	From v8 to v9	Changed	At a Glance - Hardware and software features Update to standard Features - Processor, Memory, Environmental-halogen note, Technical specifications - Software options, updated shipping weight.
		Removed	Fiber Nic references

